United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
United States Department
of Agriculture, Forest
Service; United States
Department of the
Interior, Bureau of Land
Management; and Utah
Agricultural Experiment
Station

Soil Survey of Canyonlands Area, Utah,

Parts of Grand and San Juan Counties

DATE DUE

How To Use This Soil Survey

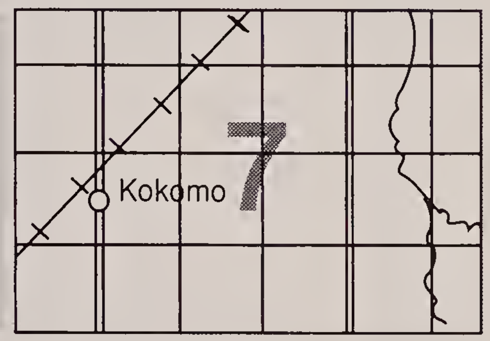
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

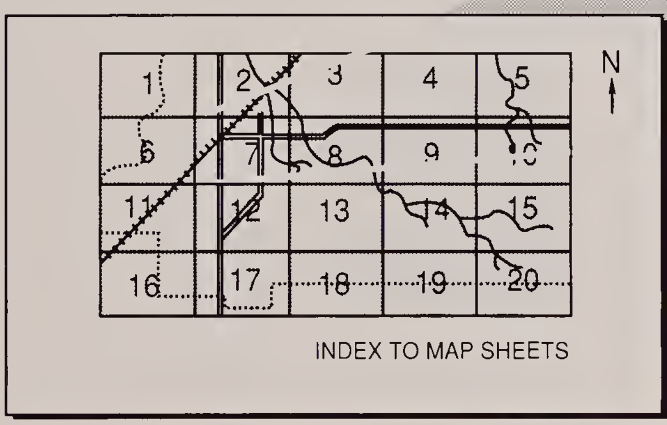
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



MAP SHEET

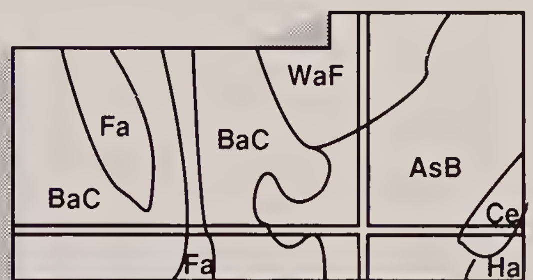
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.

MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, the Bureau of Land Management, and the Utah Agricultural Experiment Station. It is part of the technical assistance furnished to the Grand and San Juan Counties Soil Conservation Districts and the Utah Division of State Lands.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The Colorado River, Fisher Towers, and La Sal Mountains illustrate the broad range of relief in the survey area.

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Issued January 1991

Index to Map Units

Summary of Tables

Foreword

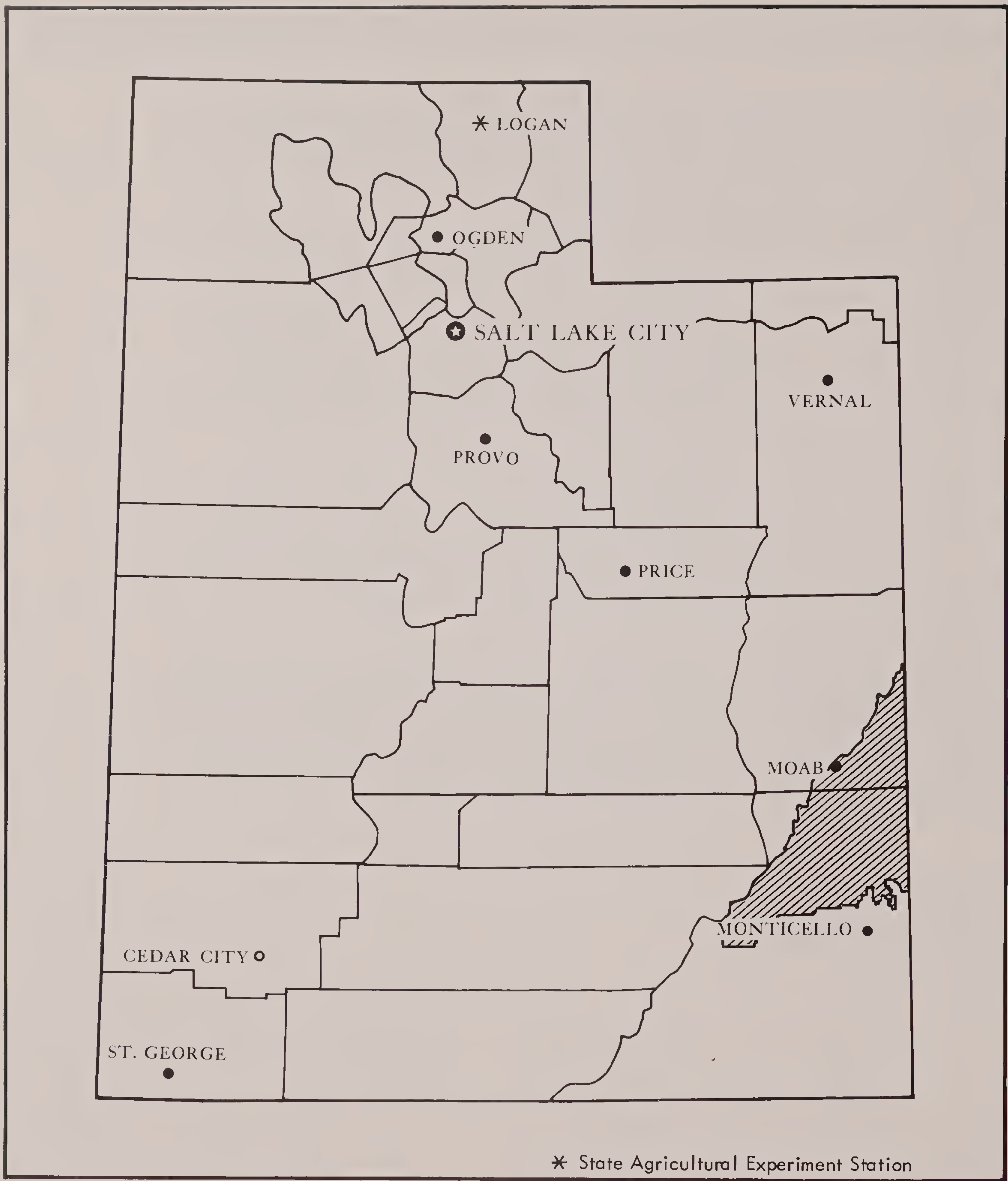
This soil survey contains information that can be used in land-planning programs in the Canyonlands Area, Utah. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Francis T. Holt
State Conservationist
Soil Conservation Service



Location of Canyonlands area in Utah.

Soil Survey of Canyonlands Area, Utah,
Parts of Grand and San Juan Counties

By Dr. Duane A. Lammers, Soil Conservation Service

Fieldwork by Dr. Duane A. Lammers, Marc B. Beroz, James W. Borchert, Alexander Hitt, Hal K. Swenson, and Andrew Vandervelde, Soil Conservation Service; Daniel M. Larsen and David Steinfield, Forest Service; and Thomas A. Zimmerman, Utah Agricultural Experiment Station

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
United States Department of Agriculture, Forest Service; United States Department of the Interior, Bureau of Land Management; and Utah Agricultural Experiment Station

The survey area is in the southeastern part of Utah. It includes the southeastern part of Grand County and the northern part of San Juan County. It has a total area of about 2,785 square miles, or 1,782,490 acres. Moab, the county seat of Grand County, and the adjacent Spanish Valley area are the only urban areas in the survey area. They have a total population of about 8,000.

Most of the survey area is public land, including parts of Canyonlands National Park, Manti-La Sal National Forest, Glen Canyon National Recreation Area, and Dead Horse Point State Park and land administered by the Bureau of Land Management. Land administered by the state is in Spanish Valley, in Castle Valley, near Potash, on the eastern side of the La Sal Mountains, and in small areas scattered throughout the survey area. Most of the privately owned land is in the Moab-Spanish Valley area, in Castle Valley, near La Sal, and on the eastern side of the La Sal Mountains.

Extracting and processing uranium, oil, gas, and potash are major industries in the area. Vast areas of rangeland are used for livestock grazing, and areas where irrigation water is available are used for alfalfa hay and orchard crops. Many tourists visit the survey area each year because of the esthetic value of the canyon areas.

The survey area consists of entrenched red rock canyon systems carved on a stepped sequence of nearly level benches and mesas, high snow-capped mountains, and anticlines of sedimentary rock. The area is a result of the forces of gravity, wind, and running water rhythmically eroding and depositing sediment over time.

The survey area, which is part of the Canyon Lands section of the Colorado Plateaus physiographic province, is an erosional landscape. Nearly one-fourth of the area is exposed bedrock, mostly sandstone. The material in which the soils formed is in areas that have a stony surface, a gravel pavement, or a windward barrier; are gently sloping; have a cemented layer; support vegetation; or are bypassed by drainageways.

The soils in the survey area vary widely in their characteristics. The soils at low elevations on canyon floors, on structural benches, and in salt valleys are dry and hot. The soils on the high mountains are cold and moist. The soils on strath terraces, alluvial fans, glacial outwash fans, moraines, and talus slopes have a high content of rock fragments. The soils that formed in eolian deposits, alluvium derived from sedimentary rock, and shale landslide material have few if any rock fragments. The soils that formed in recent eolian deposits commonly are sandy loam, loamy sand, or sand, and the soils that formed in material derived from shale are clay loam or clay. Deep soils are on

mountainsides, alluvial fans, valley fills, and gently sloping mesas, benches, and cuesta dip slopes. Shallow soils and exposed sandstone are on escarpments, rims, desert benches, and sloping to moderately steep dip slopes of anticlines and synclines.

An older survey, "San Juan Area, Utah," was published in 1962 *(29)*. This earlier survey covers a small part of the present survey, in the vicinity of La Sal. The present survey, however, updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey.

General Nature of the Survey Area

This section gives general information about the survey area. It discusses history and development; geology; physiography, drainage, and relief; natural resources; and climate.

History and Development

The survey area was inhabited by cliff dwellers centuries before Spaniards, fur trappers, and American explorers visited the area. Projectile points and other artifacts found in the La Sal Mountains indicate occupation by aborigines during the period 2000 B.C. to A.D. 1 *(10)*. The Fremont Indians occupied the area in about A.D. 900, and the Pueblo or Anasazi Indians from about A.D. 1075 until late in the 12th century *(13)*. Many dwellings and granaries were built by the Anasazi Indians in the Needles area of Canyonlands National Park and farther south in the Beef Basin and Dark Canyon Plateau areas. These early dwellers grew irrigated corn, beans, and squash by using ditches lined with flagstones to carry water to the crops. Evidence suggests that a drought and flash floods from intense summer thunderstorms forced the Anasazi Indians to abandon the area *(4)*.

The Old Spanish Trail, a pack mule route from Santa Fe to Los Angeles, crossed the Colorado River near what is now Moab. Fur trappers, Spanish explorers, and Catholic priests from the Spanish Missions were the first non-Indians in the survey area. Bands of Ute and Navajo Indians patrolled the area and prevented the first attempt by the Mormon Elk Mountain Mission to settle in the area in 1855 *(17)*.

Cattlemen were the first permanent settlers in the survey area. Small individual operations became some of the largest cattle companies in the nation within a few years. By the late 1870's, large herds of cattle grazed the mountains, mesas, and canyons *(25)*.

John Wesley Powell, the best known explorer of the area, led expeditions down the Green and Colorado Rivers in 1869 and 1871 *(15)*.

Geology

From the ancient Precambrian era 570 million years ago to the Late Cretaceous period about 80 million years ago, the survey area was low and relatively flat. Some areas were under shallow seas, and some were coastal plains. Many layers of marine, coastal, and freshwater deposits accumulated during this time. The climate varied from tropical to arid. The only major feature to develop above the general surface of the land was the Uncompahgre upwarp, which started rising about 310 million years ago and has continued to do so, with the last rise occurring about 1 million years ago *(3, 4, 7, 14, 18, 20)*.

As the Uncompahgre upwarp lifted, it divided a large shallow basin in the sea called the Paradox Basin. This basin gradually sank lower, and thousands of feet of salts accumulated in the basin as the sea water evaporated *(24)*. Sediment that eroded from the Uncompahgre highland was deposited in the southwest, depressing and warping the underlying salt beds. The resulting subsurface salt flows and salt domes eventually led to the formation of "salt valleys" in the survey area. The Monument upwarp, which extends into the southwestern part of the area, was uplifted at the end of the Cretaceous period.

During the late Tertiary period, about 20 million years ago, the La Sal and Abajo Mountains were formed by laccolithic igneous intrusion *(32)*. The overlying sedimentary beds were lifted, warped, and fractured, which accelerated erosion of the previously flat rock. Upturned hogbacks that flank the La Sal Mountains and sedimentary rock remnants interfingered with the intruded igneous rock on the mountain peaks. A gradual rise of the entire intermountain region began about 11 million years ago during the late Tertiary and eventually left the area lying more than a mile higher than it had been.

The slow but consistent uplift of the Colorado Plateau allowed the Green, Dolores, and Colorado Rivers to

maintain their course and become progressively more entrenched in deep canyons *(8, 11)*. Subsurface drainage along the crest of salt anticlines flowed toward the entrenched canyons and removed the soluble salt, which resulted in the collapse of the salt domes. Erosion then excavated the salt valleys common to the Paradox Fold and Fault Belt *(4, 16)*.

The La Sal Mountains were glaciated at least nine times during the ice age, which was during the Pleistocene epoch of the Quaternary *(22)*.

During the last 1 million years, cyclical climatic changes have resulted in periods of colluvial, fluvial, and eolian deposition alternating with periods of accelerated erosion. The soils that formed in these deposits have been greatly influenced by their relative age, the erosion and deposition, and the fluctuating climate. The canyons have continued to deepen at the rate of 500 to 800 feet per million years during the Quaternary, and the rate of scarp retreat has been about 800 to 1,800 feet during the same period.

Physiography, Drainage, and Relief

The survey area is near the center of the Canyon Lands section of the Colorado Plateaus physiographic province in southeastern Utah. Several distinct physiographic features occur within the survey area. Knowledge of these is important in understanding the soils and other natural resources of the area.

In general, the nearly horizontal sedimentary rock was deformed locally by anticlines, synclines, monoclines, and igneous intrusions. Uplift of the Colorado Plateau and concurrent erosion have produced extensive canyon systems.

The dominant physiographic features are deep canyons, canyon walls of alternating erosion-resistant benches and highly erodible slopes, and broad benches that dip at a low angle to the northeast. Other distinctive features include salt anticlines and laccolithic mountains. The salt anticlines consist of linear, flat interior valleys bounded by steep escarpments with eroded hogbacks. The La Sal Mountains include three mountain masses around which the sedimentary rock of the adjoining areas are sharply upturned. Aretes, cirques, moraines, *U*-shaped valleys, outwash fans, solifluction mantles, and landslides are common features of the once-glaciated mountains *(11)*.

The major drainageways in the survey area are the Green, Dolores, and Colorado Rivers. The Green River flows in a southeasterly direction along the western boundary of the survey area to its confluence with the Colorado River. The Dolores River flows to the northwest. It is north of the La Sal Mountains and flows along the toe of the Uncompahgre upwarp, from the Utah-Colorado state line in the northeastern tip of the survey area to the southwestern corner of the survey area. The Colorado River forms the survey area boundary from the Utah-Colorado state line to the San Juan County line and from its confluence with the Green River to the southwestern corner of the survey area. These major rivers and many of the tributaries flow through deep, narrow canyons. Other tributaries follow the broader salt valleys and are extensions of radial drainageways from the La Sal Mountains.

A unique drainage situation exists where a major river flows perpendicular to a salt anticline valley. The name "Paradox" was given to such a valley just east of the survey area in Colorado where the Dolores River flows across the valley rather than along its axis. The Moab-Spanish Valley area is a similar contradiction to the usual drainage pattern in a valley. Most of the drainageways in the survey area are intermittent. Runoff from intense summer thunderstorms is rapidly shed from barren Rock outcrop and produces flash floods in the dry washes and canyon bottoms. Drainageways in the La Sal Mountains have developed radially around the mountain groups. Several small perennial streams originate in these mountains and drain into the Colorado and Dolores Rivers. Most of these streams have been diverted for irrigation, leaving downstream areas dry in summer.

Elevation ranges from less than 4,000 feet on the canyon floors to nearly 13,000 feet at the peaks of the La Sal Mountains. The canyons have steep walls that vary from a few hundred feet to 2,000 feet high or more. The broad, nearly level benches extend for miles before being interrupted by a canyon more than 1,000 feet deep. The La Sal Mountains have rugged, steep slopes that grade to moraines and outwash fans that are deeply dissected by *V*-shaped canyons that extend to the surrounding tablelands.

Natural Resources

Soil, surface and ground water, natural vegetation, oil, natural gas, uranium, gold, silver, copper, potash, and scenic beauty are the major natural resources of the survey area.

Soil is the most widely used natural resource in the area. During summer, surface runoff from the La Sal Mountains is used extensively for irrigation of alfalfa, small grain, corn, and orchard crops. Water is pumped from the Colorado and Dolores Rivers to irrigate crops on adjacent flood plains. Wells and springs are

important sources of water for domestic uses and for irrigation. Small seeps, springs, ephemeral streams, and potholes in the slickrock are important sources of water for livestock and wildlife.

The arid canyon floors and lower benches support sparse natural vegetation that provides limited livestock grazing if properly managed. The production of forage is much higher on the high mesas and mountainsides. Pinyon and Utah juniper woodlands provide firewood and fenceposts. Engelmann spruce, subalpine fir, ponderosa pine, and quaking aspen on the La Sal Mountains provide some merchantable timber.

In 1960 oil and gas were discovered in the Lisbon Field south of La Sal, in San Juan County. This field has produced 40 million barrels of oil and 300 billion cubic feet of gas *(5)*. Gold, silver, and copper have been mined in the La Sal Mountains, in Lisbon Valley, and in the alluvium along the Colorado and Dolores Rivers, but they are of little economic importance at present *(25)*. Large deposits of uranium are present in the survey area. More than 40,000 tons of uranium oxide has been produced, about 75 percent of which was extracted in the Lisbon Valley mining district *(6)*. Potash is mined from the evaporite deposits of the Paradox Formation on the northeastern flank of the Cane Creek anticline, about 7 miles southwest of Moab. The mine is expected to produce about 300,000 tons of premium grade white muriate of potash per year for 20 years *(21)*.

The scenic value provided by the natural rock formations, the rivers flowing through the deep canyons, and the snow-capped mountains attracts thousands of visitors to the survey area each year. Campsites, picnic areas, hiking trails, four-wheel drive trails, and other facilities have been developed in the Canyonlands National Park, Dead Horse Point State Park, and Manti-La Sal National Forest and on lands administered by the Bureau of Land Management. Many people float on the Green and Colorado Rivers through Cataract and Westwater Canyons and in other sections of these rivers each year.

Climate

By Gaylen L. Ashcroft, assistant climatologist, Utah State University.

Most of the survey area lies on a high plateau. The majority of the plateau is at an elevation of 5,000 to 7,500 feet and is dissected by numerous deep canyons that terminate at the Colorado River. Near the center of the survey area, the La Sal Mountains rise abruptly, with peaks in excess of 12,000 feet. Mount Peal, for example, has an elevation of 12,271 feet.

The range in elevation and the rugged topography produce considerable variations in the climate of the survey area. The annual precipitation ranges from less than 8 inches to more than 30 inches. Most of the winter precipitation is produced by frontal storms that approach the area from the west. Most of the summer moisture is deposited by thunderstorms as moisture-laden air from the Gulf of Mexico moves across the area from the south and southeast or as Pacific moisture is entrained into the air flowing from the southwest. Closed low-pressure systems, which can develop at any time of the year but are more frequent in spring and fall, account for significant amounts of moisture in most years.

The precipitation in October through April varies from less than 6 inches to more than 20 inches. Most of the precipitation during this period comes from frontal storms, and some of it is deposited as snow. The precipitation is much heavier in the higher mountainous areas, where the storm systems are being lifted as they pass over the mountains.

The precipitation in May through September, the growing season for most crops, ranges from about 3 inches to more than 10 inches. Generally, more precipitation occurs during the latter half of the growing season than during the first half. Most of this precipitation results from thunderstorms, which occasionally produce intense showers that can deposit 1.5 inches of precipitation or more in a few hours. Flash floods sometimes occur in streambeds that are dry normally.

Average annual snowfall is about 20 to 70 inches on the plateau, 10 inches along the Colorado River, and 80 to 100 inches in the La Sal Mountains.

Temperatures of the plateau vary markedly with the topography. The mean annual temperature ranges from 44 to 56 degrees F. The warmest month is July, with an average maximum temperature of 82 to 99 degrees. January is the coldest month, with an average minimum temperature of 11 to 31 degrees. At Moab, the extreme maximum temperature on record was 113 degrees and the extreme minimum temperature was -24 degrees.

Summaries of climatic data, as recorded at La Sal, Canyonlands-The Needle, and Moab, are given in table 1. The climate at Moab is most representative of that in the areas below the plateau, near the banks of the Colorado River; the climate at Canyonlands-The Needle is representative of the lower elevations on the plateau; and the climate at La Sal is representative of the higher parts of the plateau.

The length of the growing season decreases almost

linearly with increases in elevation. It ranges from more than about 160 days along the rivers to less than 20 days at the tops of the La Sal Mountains.

Estimates of pan evaporation are given in table 2. Pan evaporation in the survey area ranges from 42 to 61 inches during May through October.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually onto one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests *(30)*. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped into general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

Map Unit Descriptions

Dominantly Well Drained and Somewhat Excessively Drained, Nearly Level to Moderately Steep Soils on Low Benches, Terraces, Cuestas, and Valleys in an Arid Climatic Zone

This group consists of three map units. It makes up about 13 percent of this survey area.

1. Rock Outcrop-Moenkopie

Rock outcrop, and shallow, well drained, gently sloping to strongly sloping soils that formed in residuum derived from sandstone; on low benches and cuestas

This map unit is in the west-central part of the survey area (fig. 1). Slopes are 3 to 15 percent. The vegetation on Moenkopie soils is mainly shadscale, blackbrush, and Mormon tea.

This unit makes up about 4 percent of the survey area. It is about 70 percent Rock outcrop and 20 percent Moenkopie and similar soils. The remaining 10 percent is soils of minor extent.

The Rock outcrop consists of exposed areas of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

The Moenkopie soils formed in residuum derived dominantly from sandstone. The surface layer is reddish brown gravelly loamy sand. The underlying material to a depth of 8 inches is reddish brown sandy loam. Sandstone is at a depth of 8 inches.

Of minor extent in this unit are Arches, Sheppard, and Nepalto soils.

This unit is used as recreation areas, wildlife habitat, and rangeland.

The main limitations for rangeland are the depth to bedrock, low available water capacity, and low annual precipitation.

2. Moenkopie-Rock Outcrop-Hoskinnini

Shallow, well drained, nearly level to moderately steep soils that formed in residuum derived from sandstone and limestone, and Rock outcrop; on low benches and cuestas

This map unit is in the west-central and northwestern parts of the survey area. Slopes are 1 to 30 percent. The vegetation on the Moenkopie and Hoskinnini soils is mainly shadscale, blackbrush, horsebrush, and Mormon tea.

This unit makes up about 5 percent of the survey area. It is about 50 percent Moenkopie and similar soils, 20 percent Rock outcrop, and 10 percent Hoskinnini soils. The remaining 20 percent is components of minor extent.

The Moenkopie soils formed in residuum derived dominantly from sandstone. The surface layer is reddish brown gravelly loamy sand. The underlying material to a

Figure 1.—Area of general soil map unit 1.

depth of 8 inches is reddish brown sandy loam. Sandstone is at a depth of 8 inches.

Rock outcrop consists of exposed areas of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

The Hoskinnini soils formed in residuum derived dominantly from limestone and sandstone. The surface layer is reddish yellow very gravelly fine sandy loam. The subsoil is reddish brown sandy clay loam and cobbly clay loam. Sandstone is at a depth of 14 inches.

Of minor extent in this unit are Trail, Arches, Nepalto, Cataract, Moab, and Thoroughfare soils and Badland.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The main limitations for rangeland are the depth to bedrock, low available water capacity, and low annual precipitation.

3. Thoroughfare-Sheppard-Nakai

Very deep, well drained and somewhat excessively drained, nearly level and gently sloping soils that formed in alluvium and eolian deposits derived from sandstone and shale; on valley floors and low benches

This map unit is in the south-central and northwestern parts of the survey area. Slopes are 0 to 8 percent. The vegetation on the Thoroughfare soils is mainly greasewood, shadscale, and big sagebrush. The vegetation on the Sheppard soils is mainly Indian ricegrass, Mormon tea, and sand dropseed. The vegetation on the Nakai soils is mainly galleta, Mormon tea, and shadscale.

This unit makes up about 4 percent of the survey area. It is about 35 percent Thoroughfare and similar soils, 20 percent Sheppard and similar soils, and 15 percent Nakai and similar soils. The remaining 30 percent is soils of minor extent.

The Thoroughfare soils are on valley floors. These soils are well drained. They formed in alluvium derived dominantly from sandstone and shale. The surface layer is dark red fine sandy loam. Below this to a depth of 60 inches or more is red, stratified fine sandy loam and gravelly loamy sand.

The Sheppard soils are on structural benches. These

soils are somewhat excessively drained. They formed in eolian deposits derived dominantly from sandstone. The surface layer is red fine sand. The underlying material is red and reddish yellow fine sand, loamy fine sand, and loamy sand.

The Nakai soils are on structural benches. These soils are well drained. They formed in eolian deposits derived dominantly from sandstone. The surface layer is yellowish red fine sand. The underlying material is yellowish red and reddish yellow fine sandy loam and fine sand.

Of minor extent in this unit are Moab, Trail, Bluechief, Cataract, Nepalto, and Moenkopie soils on benches and Ustic Torrifluvents and Typic Ustifluvents on flood plains.

This unit is used as rangeland, wildlife habitat, irrigated cropland, and recreation areas.

The main limitations for rangeland are the low annual precipitation and the moderately low available water capacity of the Sheppard soils. The main limitations for growing irrigated crops are the hazard of erosion on the Thoroughfare soils and the hazard of soil blowing, rapid permeability, and moderately low available water capacity of the Sheppard soils.

Dominantly Well Drained, Gently Sloping to Extremely Steep Soils on Benches, Cuestas, Mesas, Escarpments, and Canyon Walls in a Semiarid Climatic Zone

This group consists of two map units. It makes up about 17 percent of the survey area.

4. Ustic Torriorthents-Lithic Torriorthents-Rock Outcrop

Shallow to very deep, strongly sloping to extremely steep soils that formed in colluvium and residuum derived from sedimentary rock, and Rock outcrop; on escarpments and canyon walls

This map unit is throughout the survey area, along the Colorado and Green Rivers and their tributaries. Slopes are 10 to 80 percent. The vegetation on this unit is mainly blackbrush, galleta, and Mormon tea.

This unit makes up about 12 percent of the survey area. It is about 35 percent Ustic Torriorthents, 20 percent Lithic Torriorthents, and 20 percent Rock outcrop. The remaining 25 percent is components of minor extent.

The Ustic Torriorthents are on talus cones. These soils are moderately deep to very deep. They formed in colluvium derived dominantly from sandstone and shale. The surface layer is yellowish red very cobbly loamy fine sand. The underlying material is yellowish red extremely stony fine sandy loam.

The Lithic Torriorthents are on escarpments and ledges. These soils are shallow. They formed in colluvium and residuum derived dominantly from sandstone. The soils are yellowish red gravelly fine sandy loam throughout. Sandstone is at a depth of 15 inches.

Rock outcrop consists of exposed areas of sandstone in the form of ledges, cliffs, and monoliths.

Of minor extent in the unit are Badland on shale escarpments, Nepalto soils on alluvial fans, and Thoroughfare soils on alluvial bottoms.

This unit is used as recreation areas, wildlife habitat, and rangeland.

5. Rock Outcrop-Rizno, Dry-Mido

Rock outcrop, and shallow and very deep, gently sloping to steep soils that formed in residuum and eolian deposits derived from sandstone and shale; on escarpments, mesas, benches, and cuestas

This map unit is in the southern and west-central parts of the survey area. Slopes are 2 to 35 percent. The vegetation on the Rizno, dry, soils is mainly blackbrush, snakeweed, galleta, and Mormon tea. The vegetation on the Mido soils is mainly fourwing saltbush, blue grama, and galleta. Elevation is 4,800 to 6,500 feet.

This unit makes up about 5 percent of the survey area. It is about 55 percent Rock outcrop, 17 percent Rizno, dry, soils, and 13 percent Mido soils. The remaining 15 percent is soils of minor extent.

The Rock outcrop consists of exposed areas of sandstone in the form of ledges, cliffs, fins, and slickrock.

The Rizno, dry, soils are on benches, escarpments, and cuestas. These soils are shallow. They formed in residuum and eolian deposits derived dominantly from sandstone and shale. The surface layer is light reddish brown gravelly fine sandy loam. The underlying material is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches.

The Mido soils are on sand drifts and sand shadows on benches, mesas, and cuestas. These soils are very deep. They formed in eolian deposits derived dominantly from sandstone. The surface layer is light brown loamy fine sand. The underlying material is yellowish red loamy fine sand and light reddish brown fine sand.

Of minor extent in the unit are Arches, Begay, Ignacio, and Leanto soils.

This unit is used as wildlife habitat, recreation, and rangeland.

The main limitations for rangeland are the shallow depth to bedrock and low available water capacity of the Rizno soils, the sandy texture and severe hazard of soil blowing on the Mido soils, and the low annual precipitation.

Dominantly Well Drained, Gently Sloping to Moderately Steep Soils on Benches, Cuestas, Fans, Mesas, Alluvial Bottoms, Stream Terraces, and Valley Floors in a Semiarid Climatic Zone

This group consists of two map units. It makes up about 25 percent of this survey area.

6. Begay-Moab-Redbank

Very deep, gently sloping to moderately steep soils that formed in alluvium and eolian deposits derived from sandstone and diorite; on benches, cuestas, alluvial fans, alluvial bottoms, stream terraces, and valley floors

This map unit is in the central and southern parts of the survey area. Slopes are 2 to 30 percent. The vegetation on the Begay soils is mainly fourwing saltbush, galleta, Indian ricegrass, and blue grama. The vegetation on the Moab soils is mainly blackbrush, galleta, and Indian ricegrass. The vegetation on the Redbank soils is mainly basin big sagebrush, fourwing saltbush, galleta, and Mormon tea.

This unit makes up about 6 percent of the survey area. It is about 50 percent Begay and similar soils, 15 percent Moab and similar soils, and 15 percent Redbank and similar soils. The remaining 20 percent is soils of minor extent.

The Begay soils are on benches and cuestas. They formed in eolian deposits derived dominantly from sandstone. The surface layer is yellowish red fine sandy loam. The subsoil is yellowish red fine sandy loam. The substratum is reddish yellow fine sandy loam and loamy fine sand.

The Moab soils are on alluvial valley floors and alluvial fans. They formed in alluvial deposits derived dominantly from sandstone and diorite. The surface layer is brown gravelly fine sandy loam. The subsoil is brown gravelly fine sandy loam. The substratum to a depth of 60 inches or more is pinkish white and pink very gravelly fine sandy loam.

The Redbank soils are on alluvial bottoms and stream terraces. They formed in alluvium derived dominantly from sandstone. The surface layer is reddish brown fine sandy loam. The underlying material is stratified, yellowish red very fine sandy loam and loam with thin lenses of sandy clay loam and sand.

Of minor extent in this unit are Mido soils on sand drifts; Sazi, Ignacio, and Newsrock soils on benches; and Strych soils on alluvial fans.

This unit is used mainly as rangeland, wildlife habitat, and recreation areas. Small areas of the Redbank soils are used as irrigated cropland.

The main limitations for rangeland management are the hazard of erosion and low annual precipitation.

7. Rizno, Dry-Rock Outcrop

Shallow, gently sloping to strongly sloping soils that formed in eolian deposits and residuum derived dominantly from sandstone and shale, and Rock outcrop; on benches, cuestas, and mesas

This map unit is throughout the survey area. Slopes are 2 to 15 percent. The vegetation on the Rizno, dry, soils is mainly blackbrush, galleta, Mormon tea, and Utah juniper.

This unit makes up about 19 percent of the survey area. It is about 45 percent Rizno, dry, and similar soils and 25 percent Rock outcrop. The remaining 30 percent is soils of minor extent.

The Rizno, dry, soils formed in eolian deposits and residuum derived dominantly from sandstone. The surface layer is light reddish brown gravelly fine sandy loam. The underlying material is reddish brown fine sandy loam. Sandstone is at a depth of 8 inches.

The Rock outcrop consists of exposed areas of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

Of minor extent in this unit are Arches, Ignacio, Leanto, Begay, Mivida, Sazi, Windwhistle, Barx, and Mido soils on benches, cuestas, and mesas and Moab soils on fans.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The main limitations for rangeland are the shallow depth to bedrock, very low available water capacity, and low annual precipitation.

Dominantly Well Drained, Gently Sloping to Very Steep Soils on Upland Benches, Landslides, Cuestas, Hillsides, and Escarpments in a Dry, Subhumid Climatic Zone

This group consists of three map units. It makes up about 32 percent of this survey area.

8. Cahona-Begay-Hagerman

Moderately deep and very deep, gently sloping soils that formed in eolian deposits derived from sandstone; on upland benches and cuestas

This map unit is in the eastern and southern parts of the survey area. Slopes are 2 to 8 percent. The vegetation is mainly Wyoming big sagebrush, blue grama, western wheatgrass, and muttongrass.

This unit makes up about 7 percent of the survey area. It is about 30 percent Cahona and similar soils, 25 percent Begay and similar soils, and 20 percent Hagerman and similar soils. The remaining 25 percent is soils of minor extent.

The Cahona soils are very deep. The surface layer is yellowish red fine sandy loam. The subsoil is reddish brown sandy clay loam and yellowish red silty clay loam. The substratum is pink fine sandy loam and loam.

The Begay soils are very deep. The surface layer is yellowish red fine sandy loam. The subsoil is yellowish red fine sandy loam. The substratum to a depth of 60 inches or more is yellowish red fine sandy loam and loamy fine sand.

The Hagerman soils are moderately deep. The surface layer is brown very fine sandy loam. The subsoil is yellowish red very fine sandy loam and brown sandy clay loam. The substratum is brown and strong brown sandy clay loam. Sandstone is at a depth of 33 inches.

Of minor extent in this unit are Redbank and Barnum soils on valley bottoms, Mido soils on sand drifts, Strych and Sedillo soils on alluvial fans, and Ignacio, Leanto, Shalako, Bond, and Rizno soils on benches and cuestas.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used as irrigated cropland and for homesite development.

The main limitations of this unit for homesite development and cropland are low soil strength and the hazards of soil blowing and water erosion.

9. Rizno-Rock Outcrop

Shallow, gently sloping to moderately steep soils that formed in residuum and eolian deposits derived from sandstone and shale, and Rock outcrop; on upland benches and cuestas

This map unit is in the eastern, central, and southern parts of the survey area. Slopes are 3 to 15 percent. The vegetation is mainly pinyon, Utah juniper, big sagebrush, Mormon tea, and antelope bitterbrush.

This unit makes up about 20 percent of the survey area. It is about 45 percent Rizno and similar soils and 35 percent Rock outcrop. The remaining 20 percent is soils of minor extent.

The Rizno soils have a surface layer of light reddish brown fine sandy loam. The underlying material is pinkish gray and reddish brown fine sandy loam. Sandstone is at a depth of 8 inches.

Rock outcrop is exposed areas of sandstone. It occurs mainly as slickrock.

Of minor extent in this unit are Anasazi, Begay, Bond, Mido, and Ignacio soils on cuestas and Bluehon and Strych soils on alluvial fans.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The main limitations for rangeland are the shallow depth to bedrock and low available water capacity.

10. Ustic Torriorthents-Ustollic Calciorthids-Ustollic Haplargids

Moderately deep to very deep, strongly sloping to very steep soils that formed in residuum and colluvium derived from shale and sandstone; on hillsides, landslides, and escarpments

This map unit is in the east-central and southeastern parts of the survey area. Slopes are 10 to 60 percent. Vegetation is mainly Utah juniper, pinyon, Indian ricegrass, serviceberry, and Mormon tea.

This unit makes up about 5 percent of the survey area. It is about 50 percent Ustic Torriorthents, 15 percent Ustollic Calciorthids, and 15 percent Ustollic Haplargids. The remaining 20 percent is components of minor extent.

The Ustic Torriorthents are on escarpments and landslides. The surface layer is yellowish brown very cobbly sandy loam. The underlying material is brown to light gray very cobbly and very gravelly sandy clay loam. Shale is at a depth of 45 inches.

The Ustollic Calciorthids are on south-facing escarpments and hillsides. The surface layer is strong brown gravelly fine sandy loam. The subsoil is strong brown fine sandy loam and loam. The substratum is light brown gravelly loam and pink clay loam. Shale is at a depth of 40 inches.

The Ustollic Haplargids are on north-facing hillsides and landslides. The surface layer is strong brown and reddish brown stony sandy loam. The subsoil is light reddish brown stony sandy clay loam. The substratum is pink and yellowish red stony silty clay loam.

Of minor extent in this unit are Bond and Rizno soils on narrow benches, Rock outcrop, Badland, Rubble land, and Strych soils on alluvial fans.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas and for mining.

The main limitations of this unit for road construction and mining operations are steepness of slope, large stones, depth to rock, and low soil strength.

Dominantly Well Drained, Gently Sloping to Very Steep Soils on High Benches, Cuestas, Fans, Landslides, and Escarpments in Moist Subhumid and Humid Climatic Zones

This group consists of two map units. It makes up about 8 percent of this survey area.

11. Herm-Falcon-Waas

Shallow and very deep, gently sloping to moderately steep soils that formed in alluvium, residuum, colluvium, and eolian deposits derived from igneous and sedimentary rock; on high benches, cuestas, fans, and landslides

This map unit is mainly on the La Sal Mountains, in the east-central part of the survey area. A small area is on the Dark Canyon Plateau, in the southwestern part of the area. Slopes are 2 to 30 percent. Vegetation is mainly Gambel oak, ponderosa pine, and big sagebrush.

This unit makes up about 6 percent of the survey area. It is about 25 percent Herm and similar soils, 20 percent Falcon and similar soils, 20 percent Waas and similar soils, and 15 percent Tomasaki and similar soils. The remaining 20 percent is soils of minor extent.

The Herm soils are on landslides. These soils are very deep. They formed in colluvium derived dominantly from shale and sandstone. The surface layer is dark brown stony loam and brown clay loam. The subsoil is brown clay.

The Falcon soils are on high benches and cuestas. These soils are shallow. They formed in residuum derived dominantly from sandstone. The surface layer is brown fine sandy loam. The subsoil is light brown sandy loam. Sandstone is at a depth of 17 inches.

The Waas soils are on benches and fans. These soils are very deep. They formed in eolian deposits derived dominantly from sandstone. The surface layer is reddish brown very fine sandy loam. The subsoil is yellowish red loam. The substratum to a depth of 60 inches or more is reddish brown loam.

The Tomasaki soils are on outwash fans. These soils are very deep. They formed in alluvium derived dominantly from diorite. The surface layer is dark brown loam. The upper part of the subsoil is yellowish red clay and clay loam. The lower part of the subsoil and the substratum are reddish brown very cobbly clay loam and light brown cobbly clay loam.

Of minor extent in the unit are Beje and Bond soils on benches, Iles soils on landslides, and Harpole, Toone, and Sirref soils on outwash fans.

This unit is used mainly as rangeland, woodland, and wildlife habitat. It is also used as recreation areas.

12. Falcon-Herm-Toone

Shallow and very deep, moderately steep to very steep soils that formed in residuum, colluvium, and alluvium derived from sedimentary rock and diorite, and Rock outcrop; on landslides and escarpments

This map unit is on the La Sal Mountains, in the east-central part of the survey area. Slopes are 10 to 65 percent. The vegetation is mainly Gambel oak, ponderosa pine, big sagebrush, and bluegrasses.

This unit makes up about 2 percent of the survey area. It is about 30 percent Falcon and similar soils, 20 percent Herm and similar soils, 15 percent Toone and similar soils, and 5 percent Rock outcrop. The remaining 30 percent is soils of minor extent.

The Falcon soils are on escarpments. These soils are shallow. They formed in residuum derived dominantly from sandstone. The surface layer is brown gravelly sandy loam. The subsoil is light brown sandy loam. Sandstone is at a depth of 17 inches.

The Herm soils are on landslides. These soils are very deep. They formed in colluvium derived dominantly from sedimentary rock. The surface layer is very dark brown and brown stony clay loam. The subsoil to a depth of 60 inches or more is brown and light brown clay.

The Toone soils are on outwash fans. These soils are very deep. They formed in alluvium derived dominantly from diorite. The surface layer is very dark gray loam and dark reddish brown silt loam. The subsoil is brown gravelly clay loam and reddish brown very gravelly clay and very stony clay.

Rock outcrop consists of exposed areas of sedimentary rock. It occurs mainly as escarpments and ledges.

Of minor extent in this unit are Bond soils on benches and Sirref and Tomasaki soils on outwash fans.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas and woodland.

Dominantly Well Drained, Gently Sloping to Very Steep Soils on High Mountainsides, Fans, Moraines, Landslides, Valley Trains, Aretes, and Cirque Basins in a Humid Climatic Zone

This group consists of three map units. It makes up about 5 percent of this survey area.

13. Flygare-Skylick-Toone

Very deep, gently sloping to steep soils that formed in colluvium, glacial till, and alluvium derived from diorite, shale, and sandstone; on high mountainsides, fans, and landslides

This map unit is on the La Sal Mountains, in the east-central part of the survey area. Slopes are 4 to 50 percent. The vegetation is mainly aspen, Gambel oak, and snowberry. Elevation is 8,300 to 9,600 feet. The average annual precipitation is about 25 to 30 inches, the mean annual air temperature is 37 to 40 degrees F, and the average freeze-free period is 30 to 60 days.

This unit makes up about 2 percent of the survey area. It is about 40 percent Flygare soils, 20 percent Skylick soils, and 20 percent Toone soils. The remaining 20 percent is soils of minor extent.

The Flygare soils are on mountainsides and outwash fans. These soils formed in alluvium and glacial till derived dominantly from diorite. The surface is covered with a mat of partially decomposed leaves and twigs. The surface layer is very dark grayish brown loam. The subsurface layer is light brown stony loam. The subsoil is light reddish brown very stony clay loam. The substratum to a depth of 60 inches or more is pink very cobbly sandy loam.

The Skylick soils are on mountainsides. These soils formed in colluvium and alluvium derived dominantly from diorite and shale. The surface layer is dark gray loam. The subsoil is reddish brown cobbly clay loam.

The Toone soils are on outwash fans. These soils formed in alluvium derived dominantly from diorite. The surface is covered with a mat of partially decomposed leaves and twigs. The surface layer is dark brown loam and gravelly loam. The subsoil is reddish yellow and yellowish red very gravelly clay loam.

Of minor extent in this unit are Broad Canyon soils on very steep mountainsides, Richens and Herd soils on gently sloping and moderately sloping remnant moraines, and Dranyon and Tolman Variant soils on sloping cuestas.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The main limitations of this unit for harvesting wood products are the susceptibility of the soil to compaction by heavy equipment when the soil is moist and the hazard of erosion.

14. Broad Canyon-Namon-Leighcan

Very deep, strongly sloping to very steep soils that formed in colluvium and glacial till derived from diorite; on high mountainsides, moraines, and valley trains

This map unit is on the La Sal Mountains, in the east-central part of the survey area. Slopes are 8 to 70 percent. The vegetation is mainly Engelmann spruce, subalpine fir, aspen, columbine, and huckleberry. Elevation is 9,000 to 12,000 feet. The average annual precipitation is about 25 to 40 inches, the mean annual air temperature is 32 to 38 degrees F, and the average freeze-free period is 20 to 60 days.

This unit makes up about 2 percent of the survey area. It is about 35 percent Broad Canyon soils, 30 percent Namon soils, and 15 percent Leighcan soils. The remaining 20 percent is components of minor extent.

The Broad Canyon soils are on mountainsides. These soils formed in colluvium derived dominantly from diorite. The surface is covered with a mat of partially decomposed leaves and needles. The surface layer is brown very cobbly loam. The subsoil is light yellowish brown very cobbly sandy loam. The substratum is light yellowish brown extremely cobbly loamy sand.

The Namon soils are on moraines. These soils formed in glacial till derived dominantly from diorite. The surface is covered with a mat of moss and undecomposed needles. The surface layer is brown gravelly loam. The subsurface layer is light reddish brown loam. The subsoil is pink gravelly loam and light reddish brown very cobbly loam.

The Leighcan soils are on mountainsides and valley trains. These soils formed in glacial till derived dominantly from diorite. The surface is covered with a mat of moss and undecomposed needles. The surface layer is brown cobbly loam and light yellowish brown gravelly coarse sandy loam. The subsoil is yellowish brown very gravelly coarse sandy loam and very cobbly coarse sandy loam.

Of minor extent in this unit are Flygare soils and Rubble land.

This unit is used mainly as woodland, rangeland, and wildlife habitat. It is also used as recreation areas.

The main limitations of this unit for harvesting wood products are steepness of slope and the susceptibility of the soil to mass movement.

15. Rubble Land-Leighcan-Meredith

Rubble land, and very deep, steep to very steep soils that formed in colluvium derived from diorite; on high mountainsides and aretes and in cirque basins

This map unit is on the La Sal Mountains, in the east-central part of the survey area. Slopes are 20 to 70 percent. The vegetation on the Leighcan and Meredith soils is mainly sedges, grasses, and Engelmann spruce. Elevation is 10,500 to 13,000 feet. The average annual precipitation is about 25 to 40 inches, the mean annual air temperature is 30 to 35 degrees F, and the average freeze-free period is 5 to 25 days.

This unit makes up about 1 percent of the survey area. It is about 45 percent Rubble land, 30 percent Leighcan soils, and 15 percent Meredith soils. The remaining 10 percent is components of minor extent.

Rubble land consists of areas that have more than 90 percent of the surface covered by stones and boulders. The voids are free of soil material and virtually free of vegetation. These areas are on aretes and rock glaciers.

The Leighcan soils are on mountainsides. These soils formed in colluvium and glacial till derived dominantly from diorite. The surface is covered with a mat of moss and undecomposed needles. The surface layer is brown cobbly loam and light yellowish brown gravelly coarse sandy loam. The subsoil is yellowish brown very gravelly coarse sandy loam and very cobbly coarse sandy loam.

The Meredith soils are in cirque basins. These soils formed in colluvium derived dominantly from diorite. The surface is covered with a mat of partially decomposed grass litter and leaves. The surface layer is dark brown stony loam. The subsoil is dark brown very cobbly loam. The substratum is brown extremely cobbly sandy clay loam.

Of minor extent in the unit are Broad Canyon soils on south-facing mountainsides, Flygare and Namon soils on outwash fans and moraines, and Rock outcrop.

This unit is used mainly as rangeland, wildlife habitat, and woodland.

The main limitations of this unit for harvesting wood products are steepness of slope and the susceptibility of the soil to mass movement. The main limitations for rangeland are steepness of slope, the severe hazard of erosion, and a short growing season.

Broad Land Use Considerations

The survey area is used mainly as rangeland, woodland, wildlife habitat, and recreation areas. Small areas are used as cropland and urban land. The diverse elevation, relief, and climate strongly influence the major land uses.

Most of the general soil map units are suitable for use as rangeland; however, units 4, 10, 12, and 15 and parts of unit 14 are limited by steepness of slope. Units 1, 2, 5, 7, and 9 are mostly Rock outcrop and shallow soils. Production of rangeland vegetation on the shallow soils is limited by shallow rooting depth and low available water capacity. The major soils in units 3, 6, 8, and 11 commonly are moderately deep to very deep and are well suited to rangeland. Production of forage on the soils in units 3, 6, and 8 is limited by low soil moisture content in most years. Unit 11 has adequate soil moisture content in most years. The Falcon soils in unit 11 are shallow and support ponderosa pine woodland. The understory vegetation on this unit is used for grazing. Unit 13 is mostly very deep soils that support quaking aspen woodland. The understory vegetation is well suited to grazing. Unit 14 is mostly covered by coniferous forest, but open areas and the areas of Broad Canyon soils that support aspen are used for grazing. Units 11 through 15 are limited to summer use in most years because of the deep snow.

Areas of units 7, 9, 10, 11, 12, 13, 14, and 15 are suited to woodland. Utah juniper and pinyon are suited to the shallow soils in units 7 and 9 and to the soils on steep slopes in unit 10. The Falcon soils in units 11 and 12 are suited to ponderosa pine. Timber harvesting in unit 12 is limited by steepness of slope. Unit 13 is well suited to quaking aspen. Woodland management in some areas of this unit is limited by steepness of slope and the susceptibility of the soil to mass movement. Engelmann spruce, subalpine fir, and quaking aspen are the dominant trees on unit 14. Steepness of slope and the susceptibility of the soil to mass movement are the main limitations for harvesting wood products. The Leighcan soils in unit 15 support scattered stands of Engelmann spruce. These soils are limited for woodland production by the steepness of slope and the high winds.

All of the general soil map units in the survey area are used as wildlife habitat. Units 11, 12, 13, and 14 are well suited to habitat for mule deer and elk. Units 1, 2, and 4 are suited to habitat for desert bighorn sheep. Some areas of units 6 and 8 are suited to habitat for pronghorn antelope. Small riparian areas, mainly along the Colorado and Green Rivers in units 1, 3, and 4, are suited to wetland wildlife habitat.

Recreation activities include hiking, camping, sightseeing by off-road vehicle, hunting, fishing, and rafting. Areas of Rock outcrop in units 1, 2, 5, 7, and 9

provide a suitable base for off-road vehicle trails. Units 11, 13, and 14 are suited to winter recreation activities such as cross country skiing and snowmobiling.

Irrigated cropland is limited to small areas where water is available for irrigation. Unit 3 has areas that are well suited to growing alfalfa, corn, orchard crops, and garden crops. The main limitations are the hazard of erosion and rapid permeability. Small areas in units 6 and 8 are suitable for irrigated crops, alfalfa, barley, and pasture. The main limitations are the hazards of water erosion and soil blowing. Small areas in unit 11 are suited to irrigated and nonirrigated cropland. The main limitations for nonirrigated cropland are the hazard of erosion, the low soil moisture content, and the length of the growing season.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Begay fine sandy loam, moist, 2 to 6 percent slopes, is one of several phases in the Begay series.

Some map units are made up of phases of subgroups. A soil subgroup is a group of soils that have

major horizons that are similar in composition, thickness, and arrangement and have a relatively broad range of properties. A subgroup may consist of several series. Subgroups were used to name map units in those areas where further separation of the soils was not necessary for the purposes of the survey. Ustic Torriorthents, warm, 10 to 50 percent slopes, is a phase of the subgroup Ustic Torriorthents.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Begay-Rizno complex, 3 to 15 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Table 3 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Map Unit Descriptions

1—Arches-Sheppard-Rock outcrop complex, 2 to 8 percent slopes. This map unit is on structural benches near Sixshooter Peaks and Indian Creek. It formed in eolian deposits derived dominantly from sandstone. Elevation is 4,700 to 4,900 feet. The average annual precipitation is 6 to 8 inches, the mean annual air temperature is 52 to 54 degrees F, and the average freeze-free period is 150 to 170 days.

This unit is 35 percent Arches fine sand, 2 to 8 percent slopes, on sand sheets; 30 percent Sheppard fine sand, 2 to 8 percent slopes, on sand drifts; 20 percent Rock outcrop; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Moenkopie gravelly loamy sand on cuestas and benches under blackbrush, 3 percent Nakai fine sand on benches and mesas under shadscale, and 2 percent Thoroughfare fine sandy loam on alluvial terraces under grasses.

The Arches soil is shallow and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are concave and are less than 100 feet long. The present vegetation in most areas is mainly Mormon tea, blackbrush, shadscale, and galleta. Typically, the surface layer is yellowish red fine sand about 4 inches thick. The substratum to a depth of 19 inches is reddish yellow fine sand over sandstone. Depth to bedrock ranges from 10 to 20 inches.

Permeability of this Arches soil is rapid. Available water capacity is less than 2 inches. Water supplying capacity is 1 to 2 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Sheppard soil is very deep and somewhat excessively drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are convex and are 50 to 100 feet long. The present vegetation in most areas is mainly Indian ricegrass, sand dropseed, Mormon tea, and sandhill muhly. Typically, the surface layer is red fine sand about 3 inches thick. The upper 27 inches of the underlying material is red fine sand, the next 12 inches is reddish yellow loamy fine sand, and the lower part to a depth of 60 inches or more is reddish yellow loamy sand.

Permeability of this Sheppard soil is rapid. Available water capacity is 4 to 5 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 0.5 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Rock outcrop is exposures of sandstone that occur as ledges, cliffs, monoliths, and slickrock.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Arches soil is 30 percent grasses, 15 percent forbs, and 55 percent shrubs. Important plants are blackbrush, Indian ricegrass, dropseed, and Mormon tea. Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth, low annual precipitation, and high hazard of soil blowing.

The potential natural plant community on the Sheppard soil is 55 percent grasses, 20 percent forbs, and 25 percent shrubs. Important plants are Indian ricegrass, sand dropseed, sand sagebrush, and fourwing saltbush. Management practices that maintain or improve the rangeland vegetation include proper

grazing use, planned grazing systems, and proper location of water developments. Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and high hazard of soil blowing. Plants suitable for seeding are fourwing saltbush, Indian ricegrass, spike dropseed, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Arches soil is in the Desert Shallow Sand (Blackbrush) range site. The Sheppard soil is in the Desert Sand range site. Rock outcrop is not assigned to a range site.

2—Badland. This map unit is in Lockhart Basin, Castle Valley, and the Richardson Amphitheater. It consists of steep or very steep, barren shale outcroppings or areas of shale interbedded with thin strata of sandstone. It is dissected by many intermittent drainageways. Local relief ranges from 25 to 500 feet.

Included in this unit are small areas of Rock outcrop that occur as narrow ledges and soils that are less than 20 inches deep and are in the more stable areas and on north-facing slopes. Also included are small areas of gypsum land along Onion Creek.

Runoff is very rapid, and geologic erosion is active.

Badland supports only very sparse vegetation, dominantly shadscale and annual forbs.

This map unit is in capability subclass VIIIs. It is not assigned to a range site.

3—Barnum loam, 0 to 3 percent slopes. This very deep, well drained soil is on alluvial bottoms in East Coyote Wash and Lisbon Valley. It formed in alluvium derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly big sagebrush, rubber rabbitbrush, and galleta. Elevation is 6,000 to 6,600 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is yellowish red loam 3 inches thick. The underlying material to a depth of 60 inches or more is stratified, yellowish red or reddish yellow loam, clay loam, and loamy fine sand.

Included in this unit are small areas of Redbank fine sandy loam on fluves under fourwing saltbush and grasses and very deep, sandy, alluvial soils on fanlettes that grade to axial stream bottoms.

Permeability of the Barnum soil is moderately slow. Available water capacity is about 6.5 to 9.5 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to very brief periods of flooding in July to September.

This unit is used as rangeland, wildlife habitat, and irrigated and nonirrigated cropland. It is also used as recreation areas and for urban development.

The potential natural plant community on this unit is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are blue grama, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, brush management, rangeland seeding, and proper location of water developments. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is fair. Plants suitable for seeding include adapted native plants, Russian wildrye, crested wheatgrass, and alfalfa.

Principal crops grown under irrigation are alfalfa and small grain. Average yields per acre per year that can be expected under a high level of management are 5 to 6 tons of alfalfa and 70 to 80 bushels of barley or oats. A suitable rotation is one that includes 6 to 8 years of alfalfa and 2 or 3 years of small grain. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. If furrow, border, or corrugation irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

Winter wheat and spring wheat are the principal nonirrigated crops. Average yields per acre per year that can be expected under a high level of management are 16 to 20 bushels of winter wheat and 10 to 14 bushels of spring wheat. The main limitations for growing crops are droughtiness, the hazard of soil blowing, and the hazard of erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Soil blowing can be reduced by returning crop residue to the soil and practicing minimum tillage. Erosion can be reduced if grain is seeded early in fall, stubble-mulch tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

If this unit is used for urban development, the main limitations are the hazard of flooding and the hazard of

soil blowing. Flooding can be controlled only by use of major flood control structures. Excavation for houses and access roads in places exposes material that is susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing.

This map unit is in capability subclasses IIIe, irrigated, and IVe, nonirrigated. It is in the Loamy Bottom range site.

4—Barnum loam, 3 to 8 percent slopes. This deep, well drained soil is on alluvial valley floors and terraces in Lisbon Valley. It formed in alluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long and are concave. The present vegetation in most areas is mainly fourwing saltbush, rubber rabbitbrush, galleta, and annual grasses. Elevation is 6,200 to 6,600 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is yellowish red loam 3 inches thick. The underlying material to a depth of 60 inches or more is stratified, yellowish red and reddish yellow loam, clay loam, and loamy fine sand.

Included in this unit are small areas of Redbank fine sandy loam, dry, on alluvial bottoms under greasewood, and Begay fine sandy loam, Ignacio fine sandy loam, dry, and Mivida fine sandy loam on benches and cuestas under fourwing saltbush and grasses.

Permeability of the Barnum soil is moderately slow. Available water capacity is about 6.5 to 9.5 inches. Water supplying capacity is 5.5 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, galleta, winterfat, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the vegetation in areas where the desirable forage plants are depleted. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is fair. The main limitation for seeding is low annual precipitation. Plants suitable for rangeland seeding include adapted native plants, crested wheatgrass, Russian wildrye, and prostrate kochia.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Semidesert Loam range site.

5—Barnum silty clay loam, 0 to 3 percent slopes. This very deep, well drained soil is on alluvial valley bottoms in Dry Valley. It formed in alluvium derived dominantly from shale and sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly greasewood, seepweed, and cheatgrass. Elevation is 5,700 to 6,000 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is light reddish brown silty clay loam 3 inches thick. The upper 40 inches of the underlying material is reddish brown and red sandy clay loam and silty clay loam, and the lower part to a depth of 60 inches or more is red and yellowish red fine sand. The soil is stratified.

Included in this unit are small areas of Redbank very fine sandy loam on valley bottoms and a soil that is similar to this Barnum soil but has a surface mantle of loamy fine sand or fine sand, is on valley bottoms, and supports greasewood. Also included are small areas of very deep, clayey soils that have a high shrink-swell potential and are on the west fork of Hatch Wash.

Permeability of this Barnum soil is slow. Available water capacity is about 5.0 to 7.5 inches. Water supplying capacity is 4.5 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is moderately saline-sodic. It is subject to very brief periods of flooding in July to September.

This unit is used as rangeland, irrigated cropland, and wildlife habitat.

The potential natural plant community on this unit is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Important plants are alkali sacaton, galleta, seepweed, black greasewood, and bottlebrush squirreltail.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main

limitations are the low annual precipitation and the saline-sodic condition of the soil.

Principal crops grown under irrigation are alfalfa, small grain, and pasture. Average yields per acre per year that can be expected of the principal crops under a high level of management are 4 tons of alfalfa, 60 bushels of barley or oats, and 4 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. The main limitations for growing crops are the hazards of soil blowing and water erosion and the saline-sodic condition of the soil. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the soil in this unit. If furrow, border, or corrugation irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Applications of irrigation water should be adjusted to leach excess salts and sodium from the root zone. Maintaining crop residue on or near the surface reduces runoff, reduces soil blowing, and helps to maintain soil tilth and organic matter content. Tillage should be kept to a minimum.

This map unit is in capability subclasses IVs, irrigated, and VIIs, nonirrigated. It is in the Alkali Flat range site.

6—Barx fine sandy loam, 3 to 8 percent slopes. This very deep, well drained soil is on benches and cuestas in Fisher Valley. It formed in eolian deposits derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly Wyoming big sagebrush, galleta, blue grama, and fourwing saltbush. Elevation is 5,700 to 6,100 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsoil is yellowish red loam and sandy clay loam about 27 inches thick. The substratum to a depth of 60 inches or more is light reddish brown fine sandy loam.

Included in this unit are 15 percent Sedillo very stony fine sandy loam on fans under Wyoming big sagebrush, 10 percent Redbank fine sandy loam on fluves under fourwing saltbush, and 5 percent Strych very cobbly fine sandy loam on fans under pinyon and juniper.

Permeability of this Barx soil is moderate. Available water capacity is about 8.5 to 10.5 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community is depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIe, nonirrigated. It is in the Upland Loam range site.

7—Begay fine sandy loam, 2 to 6 percent slopes. This very deep, well drained soil is on cuestas and benches in Dry Valley, on Flat Iron Mesa, and on Hatch Point. It formed in eolian deposits derived dominantly from sandstone. Slopes are more than 300 feet long. The present vegetation in most areas is mainly blue grama, galleta, fourwing saltbush, and Indian ricegrass. Elevation is 5,500 to 6,000 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is yellowish red fine sandy loam 3 inches thick. The subsoil is yellowish red fine sandy loam 22 inches thick. The upper 7 inches of the substratum is yellowish red fine sandy loam, and the lower part to a depth of 60 inches or more is yellowish red loamy fine sand.

Included in this unit are 8 percent Mido loamy fine sand, dry, on sand drifts under sand sagebrush; 5 percent Mivida fine sandy loam, 5 percent Ignacio fine sandy loam, dry, and 5 percent Windwhistle very fine sandy loam on benches; and 2 percent Rock outcrop.

Permeability of the Begay soil is moderately rapid. Available water capacity is about 7.0 to 9.5 inches. Water supplying capacity is 5.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter

content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Semidesert Sandy Loam range site.

8—Begay fine sandy loam, moist, 2 to 6 percent slopes. This very deep, well drained soil is on structural benches and cuestas on Harts Point, on Hatch Point, and in Beef Basin and Lisbon Valley. It formed in sandy eolian deposits derived dominantly from sandstone. Slopes are more than 300 feet long. The present vegetation in most areas is mainly big sagebrush, blue grama, galleta, and Indian ricegrass. Elevation is 5,800 to 6,300 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 45 to 49 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is yellowish red fine sandy loam 3 inches thick. The subsoil is yellowish red fine sandy loam 22 inches thick. The upper 7 inches of the substratum is yellowish red fine sandy loam, and the lower part to a depth of 60 inches or more is yellowish red loamy fine sand.

Included in this unit are 10 percent Mivida very fine sandy loam in shallow depressional areas under fourwing saltbush, 10 percent Mido loamy fine sand in sand shadows under sand sagebrush, and 5 percent Ignacio fine sandy loam that is near areas of Rock outcrop and is under Wyoming big sagebrush.

Permeability of the Begay soil is moderately rapid. Available water capacity is about 7.0 to 9.5 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where much of the potential plant community has been removed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the vegetation.

Suitability for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIe, nonirrigated. It is in the Upland Loam range site.

9—Begay-Rizno complex, 3 to 15 percent slopes. This map unit is on structural benches and cuestas on the Dark Canyon Plateau and Harts Point. Elevation is 6,900 to 7,400 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 100 to 120 days.

This unit is 45 percent Begay loamy fine sand, 3 to 15 percent slopes, on remnant eolian sheets; 35 percent Rizno fine sandy loam, 3 to 15 percent slopes, on cuesta floors; and 20 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 15 percent Anasazi gravelly loam on ridge midslopes and foot slopes under Wyoming big sagebrush and 5 percent Ignacio fine sandy loam on benches under fourwing saltbush.

The Begay soil is very deep and well drained. It formed in sandy eolian deposits derived dominantly from sandstone. The present vegetation in most areas is mainly big sagebrush, blue grama, Indian ricegrass, and galleta. Slopes are convex and are less than 100 feet long. Typically, the surface layer is yellowish red loamy fine sand about 4 inches thick. The subsoil is yellowish red fine sandy loam about 16 inches thick. The substratum to a depth of 60 inches or more is reddish yellow and pink fine sandy loam and very fine sandy loam. A layer of carbonate accumulation is at a depth of 36 inches.

Permeability of the Begay soil is moderately rapid. Available water capacity is about 7.5 to 9.5 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Rizno soil is shallow and well drained. It formed in eolian deposits over residuum derived dominantly from sandstone and interbedded sandstone and shale. The present vegetation in most areas is mainly pinyon, Utah juniper, antelope bitterbrush, and Indian ricegrass. Slopes are less than 100 feet long. Typically, the surface layer is light reddish brown fine sandy loam 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 2.0 to 3.5 inches. Effective rooting depth is 4 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential natural plant community on the Begay soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been removed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the vegetation.

Suitability for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

The potential natural plant community on the Rizno soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Indian ricegrass, Bigelow sagebrush, and Mormon tea.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential for production of posts and Christmas trees is poor.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the very low available water capacity and shallow depth to bedrock.

This map unit is in capability subclass VIIs, nonirrigated. The Begay soil is in the Upland Loam range site. The Rizno soil is in woodland suitability group 3d. It is in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site.

10—Begay-Rock outcrop-Mido complex, 2 to 35 percent slopes. This map unit is on structural bench escarpments along drainageways in Dry Valley, Harts Draw, Hatch Wash, and Kane Springs Canyon. Elevation is 5,200 to 6,000 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 35 percent Begay fine sandy loam, 2 to 8 percent slopes, on intermediate benches separated by rock ledges and walls; 25 percent Rock outcrop; 15 percent Mido loamy fine sand, dry, 8 to 35 percent slopes, on sand shadows and sand drifts; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 5 percent Ignacio fine sandy loam, dry, on narrow benches under fourwing saltbush; 5 percent Leanto fine sandy loam that is adjacent to Rock outcrop and supports Bigelow sagebrush; 10 percent Windwhistle very fine sandy loam and Sazi very fine sandy loam on narrow benches and small mesas under fourwing saltbush; and 5 percent Redbank fine sandy loam, dry, on narrow alluvial bottoms under fourwing saltbush.

The Begay soil is very deep and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly Indian ricegrass, galleta, blue grama, and fourwing saltbush. Typically, the surface layer is yellowish red fine sandy loam 3 inches thick. The subsoil is yellowish red fine sandy loam 22 inches thick. The upper 7 inches of the substratum is yellowish red fine sandy loam, and the lower part to a depth of 60 inches or more is yellowish red loamy fine sand.

Permeability of the Begay soil is moderately rapid. Available water capacity is 7.0 to 9.5 inches. Water supplying capacity is 5.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

Rock outcrop is exposures of sandstone that occur as ledges, cliffs, monoliths, and slickrock.

The Mido soil is very deep and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are north- or east-facing, concave to convex, and less than 100 feet long. The present vegetation in most areas is mainly Indian ricegrass, sandhill muhly, galleta, and Mormon tea. Typically, the surface layer is light brown loamy fine sand 3 inches thick. The upper 24 inches of the underlying material is yellowish red and light reddish brown loamy fine sand, and the lower part to a depth of 60 inches or more is light reddish brown, light brown, and reddish yellow fine sand.

Permeability of the Mido soil is rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 3.5 to 6.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on the Begay soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

The potential natural plant community on the Mido soil is 50 percent grasses, 15 percent forbs, and 35 percent shrubs. Important plants are Indian ricegrass, Mormon tea, dropseed, fourwing saltbush, and sandhill muhly.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Chemical spraying and seeding can be used to improve the vegetation in areas where the desirable forage plants are depleted. It is desirable to apply improvement practices that cause the least amount of soil disturbance because of the high hazard of soil blowing.

Suitability for rangeland seeding is poor. The main limitations for seeding are the high hazard of soil blowing and low annual precipitation. Plants suitable for seeding include fourwing saltbush, Indian ricegrass, sand dropseed, and other native plants.

This map unit is in capability subclass VIIs, nonirrigated. The Begay soil is in the Semidesert Sandy Loam range site. The Mido soil is in the Semidesert Sand range site.

11—Bluechief fine sandy loam, 1 to 8 percent slopes. This moderately deep, well drained soil is on strath terraces near Indian Creek and Salt Creek, in the Sixshooter Peaks area. It formed in alluvium derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly galleta, shadscale, Indian ricegrass, and Mormon tea. Elevation is 4,800 to 5,200 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 53 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is yellowish red fine sandy loam 3 inches thick. The subsoil is yellowish red fine sandy loam 22 inches thick. The substratum is light reddish brown fine sandy loam 13 inches thick over sandstone. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are 15 percent Nakai fine sand on benches and 5 percent Arches fine sand on benches under blackbrush.

Permeability of the Bluechief soil is moderately rapid. Available water capacity is about 4 to 5 inches. Water supplying capacity is 3.0 to 4.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are galleta, fourwing saltbush, Indian ricegrass, winterfat, and dropseed.

Management practices that maintain or improve the

rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the low annual precipitation. Plants suitable for critical area seeding are adapted native plants and prostrate kochia.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Desert Sandy Loam range site.

12—Bluechief-Hanksville-Leeko complex, 1 to 15 percent slopes. This map unit is on dissected benches and cuestas on Hotel Mesa in the Dolores Triangle. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 54 degrees F, and the average freeze-free period is 140 to 170 days.

This unit is 40 percent Bluechief fine sandy loam, 1 to 8 percent slopes, on cuesta dip slopes; 20 percent Hanksville clay loam, 3 to 15 percent slopes, on back slopes and hill shoulders; 15 percent Leeko loamy fine sand, 1 to 3 percent slopes, on alluvial terraces; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Thoroughfare fine sandy loam on alluvial bottoms under grasses; 5 percent Rizno gravelly fine sandy loam, dry, on remnant cuesta dip slopes under juniper and pinyon; 5 percent Naki fine sand on eolian sheets under grasses; 2 percent Ustic Torriorthents on escarpments under blackbrush; and 3 percent Moab very cobbly fine sandy loam on strath terraces under blackbrush.

The Bluechief soil is moderately deep and well drained. It formed in eolian and slopewash deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly shadscale, blackbrush, galleta, and sand dropseed. Typically, the surface layer is yellowish red fine sandy loam 3 inches thick. The subsoil is yellowish red fine sandy loam 22 inches thick. The substratum is light reddish brown fine sandy loam 13 inches thick over sandstone. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Bluechief soil is moderately rapid. Available water capacity is about 4 to 5 inches. Water supplying capacity is 3.0 to 4.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Hanksville soil is deep and well drained. It formed in residuum derived dominantly from shale. Slopes are convex and are less than 100 feet long. The present vegetation in most areas is mainly sparse shadscale and deserttrumpet. Typically, the surface layer is light yellowish brown clay loam 2 inches thick. The upper 19 inches of the substratum is yellowish brown clay loam, and the lower part to a depth of 37 inches is grayish brown clay loam. Fractured shale is at a depth of 37 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Hanksville soil is slow. Available water capacity is about 3.5 to 6.0 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Leeko soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Slopes are concave and are less than 100 feet long. The present vegetation in most areas is mainly greasewood, seepweed, shadscale, and galleta. Typically, the surface layer is brown loamy fine sand 2 inches thick. The subsoil is reddish yellow and yellowish red loam 12 inches thick. The upper 37 inches of the substratum is light brown sandy clay loam and sandy loam, and the lower part to a depth of 60 inches or more is strong brown loamy sand.

Permeability of the Leeko soil is moderately slow. Available water capacity is about 7.0 to 8.5 inches. Water supplying capacity is 4.5 to 5.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is strongly sodic.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on the Bluechief soil is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are galleta, fourwing saltbrush, Indian ricegrass, winterfat, and dropseed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the low annual precipitation.

The potential plant community on the Hanksville soil is 25 percent grasses, 15 percent forbs, and 60 percent shrubs. Important plants are shadscale, bottlebrush

squirreltail, winterfat, and Indian ricegrass.

The suitability for grazing is limited because of the low production and relative unpalatability of the dominant plants. Proper grazing use and planned grazing systems should be used.

Suitability for rangeland seeding is very poor. The main limitation is the low annual precipitation.

The potential natural plant community on the Leeko soil is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Important plants are alkali sacaton, bottlebrush squirreltail, galleta, seepweed, and black greasewood.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and sodicity of the soil.

This map unit is in capability subclass VIIe, nonirrigated. The Bluechief soil is in the Desert Sandy Loam range site. The Hanksville soil is in the Desert Clay (Shadscale) range site. The Leeko soil is in the Alkali Flat range site.

13—Bluehon stony loam, 2 to 15 percent slopes. This moderately deep, well drained soil is on erosional alluvial fan remnants on the west slope of the La Sal Mountains. It formed in alluvium derived dominantly from igneous rock. Slopes are 100 to 300 feet long and face west. The present vegetation in most areas is mainly pinyon, Utah juniper, and Mormon tea. Elevation is 6,200 to 7,000 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is reddish brown stony loam 5 inches thick. The subsoil is dark reddish gray cobbly sandy clay loam and pinkish gray very cobbly sandy clay loam 10 inches thick. The substratum is pinkish white very cobbly sandy loam 18 inches thick over a carbonate-cemented hardpan. Depth to the hardpan ranges from 20 to 40 inches.

Included in this unit are Moab very cobbly fine sandy loam on south-facing side slopes of fans under blackbrush, Strych very cobbly fine sandy loam on north-facing side slopes of fans, and Moab gravelly fine sandy loam on recent fan back slopes and inset fans under blackbrush.

Permeability of the Bluehon soil is moderately rapid. Available water capacity is 2.0 to 2.5 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is an overstory of pinyon and Utah juniper with a canopy of 20 percent. The understory vegetation is 40 percent grasses, 5 percent forbs, and 55 percent shrubs. Important plants are muttongrass, Nevada bluegrass, prairie junegrass, pinyon, green Mormon tea, and rock goldenrod.

The site index for pinyon and Utah juniper is 75. Average yields are 9 cords of wood per acre per year. The potential is fair for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitations are the rock fragments on the surface and low available water capacity. Managing brush and thinning or eradicating the pinyon and Utah juniper can improve the rangeland vegetation.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 2x and in the Upland Stony Loam (Pinyon-Utah Juniper) woodland site.

14—Bond-Rizno fine sandy loams, 3 to 15 percent slopes. This map unit is on structural benches and cuestas throughout the survey area. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly pinyon, Utah juniper, antelope bitterbrush, and Nevada bluegrass. Elevation is 6,000 to 7,200 feet. The average annual precipitation is 12 to 15 inches, the mean annual air temperature is 45 to 49 degrees F, and the average freeze-free period is 100 to 130 days.

This unit is 40 percent Bond fine sandy loam, 3 to 15 percent slopes, on eolian sheets; 30 percent Rizno fine sandy loam, 3 to 15 percent slopes, on cuesta floors; and 30 percent other soils and miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Rock outcrop on escarpment rims, ledges, and fluve floors, 10 percent Windwhistle very fine sandy loam in eolian basins under Wyoming big sagebrush, 5 percent Leanto fine sandy

loam under black sagebrush, and 5 percent Barx fine sandy loam in eolian basins under Wyoming big sagebrush.

The Bond soil is shallow and well drained. It formed in eolian deposits derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The upper 4 inches of the subsoil is yellowish red very fine sandy loam, and the lower 13 inches is yellowish red loam and sandy clay loam. Sandstone is at a depth of 19 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Bond soil is moderate. Available water capacity is 2.5 to 3.5 inches. Water supplying capacity is 3.5 to 5.5 inches. The organic matter content of the surface layer is 1 to 3 percent. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Rizno soil is shallow and well drained. It formed in eolian deposits and residuum derived dominantly from sandstone and shale. Typically, the surface layer is light reddish brown fine sandy loam 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 2 to 3 inches. The organic matter content of the surface layer is 1 to 3 percent. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, woodland, wildlife habitat, and recreation areas.

The potential natural plant community on the Bond and Rizno soils is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Mormon tea, Indian ricegrass, Bigelow sagebrush, and blue grama.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor on the Bond soil and very poor on the Rizno soil. The main limitations are the shallow soil depth and low available water capacity. Plants suitable for seeding are adapted native plants, crested wheatgrass, pubescent wheatgrass, alfalfa, yellow sweetclover, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 3d and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site.

15—Bond-Windwhistle complex, 2 to 15 percent slopes. This map unit is on structural benches and cuestas on the flanks of the La Sal and Abajo Mountains. Slopes are 100 to 300 feet long and are concave to convex. Elevation is 7,400 to 7,900 feet. The average annual precipitation is 12 to 15 inches, the mean annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 100 to 120 days.

This unit is 45 percent Bond loam, 2 to 15 percent slopes; 35 percent Windwhistle very fine sandy loam, 2 to 8 percent slopes; and 20 percent other soils and miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Rock outcrop, 5 percent Falcon fine sandy loam under ponderosa pine, and 5 percent Waas very fine sandy loam on fans under mountain big sagebrush.

The Bond soil is shallow and well drained. It formed in eolian deposits derived dominantly from sandstone. The present vegetation in most areas is mainly pinyon, antelope bitterbrush, big sagebrush, and serviceberry. Typically, the surface layer is brown loam 5 inches thick. The subsoil is brown sandy clay loam 8 inches thick. Sandstone is at a depth of 13 inches. Depth to bedrock ranges from 10 to 20 inches. A layer of clay accumulation is at a depth of 3 to 13 inches.

Permeability of the Bond soil is moderate. Available water capacity is 2.5 to 3.0 inches. Water supplying capacity is 3.5 to 5.0 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Windwhistle soil is moderately deep and well drained. It formed in eolian material derived dominantly from sandstone. The present vegetation in most areas is mainly big sagebrush, Indian ricegrass, and antelope bitterbrush. Typically, the surface layer is yellowish red very fine sandy loam 2 inches thick. The subsoil is yellowish red very fine sandy loam 18 inches thick. The upper 5 inches of the substratum is yellowish red very fine sandy loam, and the lower part to a depth of 38

inches is light reddish brown loamy very fine sand. Bedrock is at a depth of 38 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Windwhistle soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 5 to 7 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, woodland, and recreation areas.

The potential natural plant community on the Bond soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Mormon tea, Indian ricegrass, Bigelow sagebrush, and blue grama.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth and low available water capacity. Plants suitable for seeding in critical areas are adapted native plants, crested wheatgrass, pubescent wheatgrass, yellow sweetclover, and prostrate kochia.

The potential natural plant community on the Windwhistle soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, brush management, rangeland seeding, and proper location of water developments.

Suitability for rangeland seeding is fair. The main limitation is the moderate depth to bedrock. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIIe, nonirrigated. The Bond soil is in woodland suitability group 3d and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site. The Windwhistle soil is in the Upland Loam range site.

16—Bookcliff Variant-Beje complex, 2 to 15 percent slopes. This map unit is on structural benches and cuestas near Kirks Basin. Elevation is 7,600 to 8,200 feet. The average annual precipitation is 16 to 20 inches, the mean annual air temperature is 41 to 44 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 40 percent Bookcliff Variant fine sandy loam, 2 to 15 percent slopes; 35 percent Beje loam, 2 to 15 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Herm stony loam on landslides under oak, 10 percent Waas very fine sandy loam in shallow depressional areas and valley bottoms under mountain big sagebrush, and 5 percent Iles stony loam on landslide ridges and terminal lobes under mountain big sagebrush.

The Bookcliff Variant soil is moderately deep and well drained. It formed in eolian deposits overlying residuum derived dominantly from sandstone. Slopes are 50 to 100 feet long and are convex. The present vegetation in most areas is mainly Gambel oak, snowberry, and needleandthread. Typically, the surface layer is brown fine sandy loam 4 inches thick. The upper 6 inches of the subsoil is dark reddish brown loam, and the lower 17 inches is reddish brown sandy clay loam and clay loam. Sandstone is at a depth of 27 inches. A layer of clay accumulation is at a depth of 10 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of this Bookcliff Variant soil is moderately slow. Available water capacity is 3.5 to 4.5 inches. Water supplying capacity is 6 to 9 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Beje soil is shallow and well drained. It formed in eolian deposits overlying residuum derived dominantly from sandstone. Slopes are 50 to 100 feet long and are convex. The present vegetation in most areas is mainly Wyoming big sagebrush, snowberry, Utah serviceberry, and arrowleaf balsamroot. Typically, the surface layer is brown loam 7 inches thick. The subsoil to a depth of 19 inches is brown sandy clay loam. Sandstone is at a depth of 19 inches. A layer of clay accumulation is at a

depth of 7 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Beje soil is moderate. Available water capacity is about 3.0 to 3.5 inches. Water supplying capacity is 5.5 to 7.5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Bookcliff Variant soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is fair. The main limitations are the moderately low available water capacity and moderate depth to bedrock. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

The potential plant community on the Beje soil is 55 percent grasses, 15 percent forbs, and 30 percent shrubs. Important plants are needleandthread, bluegrass, slender wheatgrass, saline wildrye, and mountain big sagebrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitation is the shallow depth to bedrock.

This map unit is in capability subclass VIIs, nonirrigated. The Bookcliff Variant soil is in the Mountain Loam (Oak) range site. The Beje soil is in the Mountain Shallow Loam (Mountain Big Sagebrush) range site.

17—Broad Canyon very cobbly loam, 50 to 70 percent slopes. This very deep, well drained soil is on mountain slopes and glacial moraines in the La Sal Mountains. It formed in glacial till and colluvium derived dominantly from porphyritic diorite. Slopes are less than 100 feet long and are convex. The present vegetation in most areas is mainly quaking aspen, aspen peavine, Colorado columbine, and scattered Engelmann spruce. Elevation is 8,400 to 10,600 feet. The average annual precipitation is 30 to 35 inches, the mean annual air temperature is 35 to 38 degrees F, and the average freeze-free period is 30 to 50 days.

Typically, the surface is covered with a mat of partially decomposed leaves and twigs 5 inches thick. The surface layer is brown very cobbly loam about 11 inches thick. The subsoil is light yellowish brown very cobbly sandy loam about 19 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown extremely cobbly loamy sand.

Included in this unit are 10 percent Broad Canyon very stony loam on ridges under grasses and forbs, 10 percent Flygare loam under quaking aspen, 5 percent Leighcan cobbly loam on moraines under Engelmann spruce, and 5 percent Rubble land.

Permeability of this Broad Canyon soil is moderate. Available water capacity is 2.5 to 4.0 inches. Water supplying capacity is 10 to 13 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as woodland, rangeland, and wildlife habitat.

The seral plant community on this unit is an overstory of aspen with a canopy of 60 percent. The understory vegetation is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are brome, wheatgrass, needlegrass, blue wildrye, and quaking aspen. The potential natural plant community is an overstory of Engelmann spruce and subalpine fir.

This unit is poorly suited to the production of aspen. The main concern in producing and harvesting timber is the steepness of slope, which makes logging and road building difficult. Roads built on this unit require extensive cuts and fills and are susceptible to mass movement because of the steepness of slope. Conventional methods of harvesting timber are difficult to use because of the steepness of slope.

This unit is limited for use by livestock because of the steepness of slope.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 3r and in the High Mountain Very Steep Loam (Aspen) woodland site.

18—Broad Canyon very stony loam, 50 to 70 percent slopes. This very deep, well drained soil is on mountainsides in the La Sal Mountains. It formed in

colluvium derived dominantly from diorite. Slopes are convex and are 100 to 300 feet long. The present vegetation in most areas is mainly snowberry, mountain sedge, mountain brome, and bluegrass. Elevation is 10,000 to 11,500 feet. The average annual precipitation is 25 to 30 inches, the mean annual air temperature is 36 to 40 degrees F, and the average freeze-free period is 30 to 50 days.

Typically, the surface layer is dark brown very stony loam about 15 inches thick. The subsoil is brown very cobbly loam about 17 inches thick. The substratum to a depth of 60 inches or more is brown extremely cobbly loam.

Included in this unit are about 10 percent Leighcan cobbly loam on upper north- and east-facing side slopes under Engelmann spruce, 10 percent Flygare loam along drainageways and in east-facing depressional areas under quaking aspen, and 5 percent Rubble land. Also included are small areas of very deep, very gravelly soils that have a thicker dark-colored surface layer and are in depressional areas.

Permeability of the Broad Canyon soil is moderate. Available water capacity is about 3 to 5 inches. Water supplying capacity is 11 to 13 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 60 percent grasses, 25 percent forbs, and 15 percent shrubs. Important plants are Thurber fescue, mountain brome, slender wheatgrass, aspen peavine, and mountain big sagebrush.

Grazing by livestock and using management practices are severely limited because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in the High Mountain Loam (Thurber Fescue) range site.

19—Cahona fine sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on structural cuestas and benches near La Sal and in Lisbon Valley. It formed in eolian deposits derived dominantly from sandstone. Slopes are more than 300 feet long and are convex to concave. The present vegetation in most areas is mainly Wyoming big sagebrush, scarlet globemallow, Indian ricegrass, and blue grama. Elevation is 6,200 to 7,200 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 110 to 130 days.

Typically, the surface layer is yellowish red fine sandy loam 2 inches thick. The upper 4 inches of the subsoil is reddish brown sandy clay loam, and the lower 14 inches is yellowish red silty clay loam. The upper 18 inches of the substratum is pink loam, and the lower part to a depth of 60 inches or more is pink fine sandy loam. A layer of clay accumulation is at a depth of 6 to 20 inches. A layer of carbonate accumulation is at a depth of 20 to 60 inches.

Included in this unit are 10 percent Hagerman very fine sandy loam on swells; 10 percent Begay fine sandy loam, moist, on the sides of swells; and 10 percent Shalako gravelly fine sandy loam near bench rims and drainageways under pinyon and juniper.

Permeability of the Cahona soil is moderately slow. Available water capacity is about 8 to 9 inches. Water supplying capacity is 6.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as irrigated and nonirrigated cropland, rangeland, wildlife habitat, and urban development.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where a large percentage of the potential plant community has been removed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is fair. The main limitations are the low annual precipitation and the high hazard of soil blowing. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

Principal crops grown under irrigation are alfalfa and small grain. Average yields per acre per year that can be expected under a high level of management are 4 to 5 tons of alfalfa and 60 to 70 bushels of barley or oats. A suitable rotation is one that includes 6 to 8 years of alfalfa and 2 or 3 years of small grain. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the

risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

Spring wheat and winter wheat are the principal nonirrigated crops. Average yields per acre per year that can be expected under a high level of management are 16 to 20 bushels of winter wheat and 10 to 14 bushels of spring wheat. The main limitations are droughtiness, the hazard of soil blowing, and the hazard of erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage. Erosion can be reduced by seeding grain early in fall, using stubble mulch tillage, and tilling and seeding on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

If this unit is used for urban development, the main limitations are slope and the hazard of soil blowing. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Access roads should be designed to control surface runoff and to help stabilize cuts.

This map unit is in capability subclasses IIIe, irrigated, and VIe, nonirrigated. It is in the Upland Loam range site.

20—Cataract loamy fine sand, 2 to 8 percent slopes. This moderately deep, well drained soil is on fan skirts and benches in Kane Springs Canyon, in Lockhart Basin, and along Indian Creek. It formed in eolian and alluvial deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long and are undulating. The present vegetation in most areas is mainly blackbrush, shadscale, green Mormon tea, and galleta. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 54 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is red loamy fine sand 2 inches thick. The subsoil is reddish brown fine sandy loam and clay loam 7 inches thick. The substratum is light reddish brown loam 24 inches thick. Sandstone is at a depth of 33 inches. Depth to bedrock ranges from 20 to 40 inches. A layer of clay accumulation is at a depth of 2 to 9 inches. A layer of carbonate accumulation is at a depth of 9 inches.

Included in this unit are small areas of Thoroughfare fine sandy loam on narrow fluves under grasses, Moab very cobbly fine sandy loam on side slopes of alluvial fans under blackbrush, and Moenkopie gravelly loamy sand on rims and ledges under blackbrush.

Permeability of the Cataract soil is moderately slow. Available water capacity is about 4 to 6 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is less than 0.5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Important plants are blackbrush, Cutler Mormon tea, Indian ricegrass, and galleta.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation, the loamy fine sand texture of the surface layer, and the hazard of soil blowing. Plants suitable for seeding are adapted native plants and prostrate kochia.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Desert Sandy Loam (Blackbrush) range site.

21—Dranyon-Tolman Variant complex, 8 to 20 percent slopes. This map unit is on cuestas and mountain slopes in the Taylor Flat and Two Mile Creek areas, on the east flank of the La Sal Mountains. Elevation is 8,000 to 9,000 feet. The average annual precipitation is 20 to 25 inches, the mean annual air temperature is 38 to 42 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 50 percent Dranyon sandy loam, 8 to 15 percent slopes, on north-facing side slopes; 30 percent Tolman Variant cobbly loam, 10 to 20 percent slopes on south- and west-facing cuesta dip slopes; and 20 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 8 percent Skylick loam on landslides under quaking aspen, 8 percent Falcon fine sandy loam on cuesta rims under ponderosa pine, and 4 percent Toone loam on south-facing slopes under Gambel oak.

The Dranyon soil is deep and well drained. It formed in residuum derived dominantly from sandstone. Slopes are short and face north. The present vegetation in most areas is mainly quaking aspen, snowberry, and aspen peavine. Typically, the surface is covered with mat of partially decomposed leaves and twigs about 1 inch thick. The surface layer is dark grayish brown sandy loam about 13 inches thick. The upper part of the subsoil is grayish brown loam 6 inches thick, and the lower part is pink cobbly sandy clay loam and very pale brown cobbly clay loam about 19 inches thick. The substratum to a depth of 52 inches is very pale brown very cobbly clay loam. Sandstone is at a depth of 52 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Dranyon soil is moderately slow. Available water capacity is about 5.5 to 8.0 inches. Water supplying capacity is 10.5 to 16.0 inches. Effective rooting depth is 40 to 60 inches. The organic matter content of the surface layer is 5 to 7 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Tolman Variant soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Slopes are less than 100 feet long and face south or west. The present vegetation in most areas is mainly ponderosa pine, snowberry, aspen peavine, and Gambel oak. Typically, the upper 3 inches of the surface layer is very dark grayish brown cobbly loam and the lower 5 inches is brown extremely cobbly loam. The subsoil is reddish brown very cobbly sandy clay loam about 9 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Tolman Variant soil is moderate. Available water capacity is about 1 to 2 inches. Water supplying capacity is 4 to 7 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Dranyon soil is an overstory of aspen with a canopy of 60 percent. The understory plant community is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This soil is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. The main limitations in harvesting timber are slope stability and the hazard of erosion along roads, skid trails, fire lanes, and log handling areas.

The suitability for grazing is good. Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

The potential natural plant community on Tolman Variant soil is an overstory of ponderosa pine with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This soil is well suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the shallow soil depth and low available water capacity. Brushy plants such as Gambel oak and greenleaf manzanita compete with the natural regeneration of ponderosa pine. Conventional methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is wet.

Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIIs, nonirrigated. The Dranyon soil is in woodland suitability group 3o and in the High Mountain Loam (Aspen) woodland site. The Tolman Variant soil is in woodland suitability group 4d and in the Mountain Shallow Loam (Ponderosa Pine) woodland site.

22—Dumps-Pits complex. This map unit is in the Lisbon Valley and Big Indian Valley areas. It is 60 percent mine dumps and 40 percent mine pits. The mine dumps are areas of smoothed or uneven accumulations or piles of waste rock from mines. These areas are not capable of supporting plants without major reclamation. The mine pits are open excavations from which soil material and the underlying ore have been removed, exposing rock or other material that supports few, if any, plants.

This map unit is in capability subclass VIIIs. It is not assigned to a range site.

23—Factory gravelly fine sandy loam, 2 to 6 percent slopes. This moderately deep, well drained soil is on remnant mesas and benches on Hatch Point and Flat Iron Mesa and in Dry Valley. It formed in eolian deposits derived dominantly from sandstone over a buried calcium carbonate cemented hardpan. Slopes are less than 100 feet long. The present vegetation in most areas is mainly pinyon, Utah juniper, big sagebrush, and blue grama. Elevation is 6,000 to 6,500 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 130 days.

Typically, the surface layer is yellowish red gravelly fine sandy loam 2 inches thick. The upper 11 inches of the subsoil is yellowish red gravelly fine sandy loam, and the lower 5 inches is yellowish red fine sandy loam. The substratum is pink gravelly fine sandy loam 11 inches thick over an indurated, calcium carbonate cemented hardpan. Depth to the hardpan ranges from 20 to 30 inches.

Included in this unit are 20 percent Sazi very fine sandy loam on ridges under grasses, 5 percent Windwhistle very fine sandy loam on eolian sheets under grasses, and 7 percent Begay fine sandy loam on eolian sheets under grasses.

Permeability of the Factory soil is moderately rapid. Available water capacity is about 2.0 to 3.5 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 20 to 30 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade in areas where a large percentage of the potential plant community has been removed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is poor. The main limitations are the moderate depth to the hardpan and low available water capacity. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Upland Loam range site.

24—Falcon fine sandy loam, 8 to 15 percent slopes. This shallow, well drained soil is on structural benches and cuestas in the foothills of the La Sal Mountains. It formed in residuum derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly ponderosa pine, Gambel oak, serviceberry, and manzanita. Elevation is 7,500 to 8,700 feet. The average annual precipitation is 17 to 20 inches, the mean annual air temperature is 41 to 43 degrees F, and the average freeze-free period is 80 to 100 days.

Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsoil is light brown sandy loam 10 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are 10 percent Fughes loam on remnant shale hills under mountain big sagebrush, 10 percent Beje loam in shallow depressional areas under mountain big sagebrush, 5 percent Bookcliff Variant fine sandy loam under oak, and 5 percent Dranyon sandy loam on north-facing side slopes under quaking aspen.

Permeability of the Falcon soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used mainly as woodland, rangeland, and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of ponderosa pine with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This unit is well suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the shallow soil depth and low available water capacity. Brushy plants such as Gambel oak and greenleaf manzanita compete with the natural regeneration of ponderosa pine. The seedling mortality rate is moderate because of the shallow rooting depth and low available water capacity. Conventional methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is wet.

Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 4d and in the Mountain Shallow Loam (Ponderosa Pine) woodland site.

25—Falcon gravelly sandy loam, 25 to 65 percent slopes. This shallow, well drained soil is on cuestas and hogbacks on the flanks of the La Sal Mountains. It formed in residuum derived dominantly from sandstone. Slopes are 50 to 100 feet long. The present vegetation in most areas is mainly ponderosa pine, Gambel oak, serviceberry, and manzanita. Elevation is 7,500 to 8,800 feet. The average annual precipitation is 17 to 22 inches, the mean annual air temperature is 41 to 43 degrees F, and the average freeze-free period is 80 to 100 days.

Typically, the surface layer is brown gravelly sandy loam 7 inches thick. The subsoil is light brown sandy loam 10 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are 10 percent Tukuhnik loam and Falcon fine sandy loam on bench rims and ledges, 15 percent Herm stony loam on side slopes and in landslide areas under oak, and 5 percent Tomasaki loam on escarpments.

Permeability of this Falcon soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3 to 7 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is severe. Soil blowing is not a hazard.

This unit is used mainly as woodland, rangeland, and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of ponderosa with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This unit is poorly suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the hazard of erosion, the susceptibility of the soil to windthrow, and the steepness of slope, which limits the use of equipment. Brushy plants such as Gambel oak and greenleaf manzanita compete with the natural regeneration of ponderosa pine. The seedling mortality rate is moderate because of the shallow rooting depth and steepness of slope.

Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 4r and in the Mountain Shallow Loam (Ponderosa Pine) woodland site.

26—Falcon-Bond-Rock outcrop complex, 2 to 15 percent slopes. This map unit is on structural benches and cuestas in the Sweet Alice Hills and La Sal Mountains. Slopes are 100 to 300 feet long and are plane to undulating. Elevation is 7,400 to 7,800 feet. The average annual precipitation is 16 to 22 inches, the mean annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 35 percent Falcon fine sandy loam, 8 to 15 percent slopes; 30 percent Bond loam, 2 to 15 percent slopes; 15 percent Rock outcrop; and 20 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 8 percent Tolman Variant loam under ponderosa pine, 7 percent Bookcliff Variant fine sandy loam under oak, and 5 percent Waas very fine sandy loam under mountain big sagebrush. The included soils are on cuestas and benches.

The Falcon soil is shallow and well drained. It formed in eolian material mixed with residuum derived dominantly from sandstone. The present vegetation in most areas is mainly ponderosa pine, serviceberry, and manzanita. Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsoil is light brown fine sandy loam 10 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of Falcon soil is moderately rapid. Available water capacity is 1 to 2 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Bond soil is shallow and well drained. It formed in eolian deposits derived dominantly from sandstone. The present vegetation in most areas is mainly pinyon, Utah juniper, and Wyoming big sagebrush. Typically, the surface layer is brown loam 5 inches thick. The

subsoil is brown sandy clay loam 8 inches thick. Sandstone is at a depth of 13 inches. Depth to bedrock ranges from 10 to 20 inches. A layer of clay accumulation is at a depth of 3 to 13 inches.

Permeability of the Bond soil is moderate. Available water capacity is 2.5 to 3.0 inches. Water supplying capacity is 3.5 to 5.0 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as rangeland, wildlife habitat, woodland, and recreation areas.

The potential natural plant community on the Falcon soil is an overstory of ponderosa pine with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This soil is moderately suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the shallow soil depth and low available water capacity. Brushy plants such as Gambel oak and greenleaf manzanita compete with the natural regeneration of ponderosa pine. The seedling mortality rate is moderate because of the shallow rooting depth and low available water capacity. Conventional methods of harvesting timber generally are suitable, but the soil may be compacted if heavy equipment is used while the soil is wet.

Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

The potential natural plant community on the Bond soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Indian ricegrass, Bigelow sagebrush, Mormon tea, and blue grama.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush control and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is poor. The main limitations are the shallow soil depth and low available water capacity. Plants suitable for seeding are adapted native plants, crested wheatgrass, pubescent wheatgrass, alfalfa, yellow sweetclover, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Falcon soil is in woodland suitability group 4d and in the Mountain Shallow Loam (Ponderosa Pine) woodland site. The Bond soil is in woodland suitability group 3d and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site.

27—Falcon-Bond-Rock outcrop complex, 15 to 70 percent slopes. This map unit is on mountain slopes and escarpments in the Sweet Alice Hills and La Sal Mountains. Slopes are 100 to 300 feet long, are concave, and mostly face north. Elevation is 7,400 to 8,000 feet. The average annual precipitation is 16 to 22 inches, the mean annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 35 percent Falcon gravelly sandy loam, 25 to 65 percent slopes; 25 percent Bond loam, 15 to 70 percent slopes; 20 percent Rock outcrop; and 20 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of moderately deep and very deep, loamy soils that have a dark-colored surface layer and have a layer of clay accumulation in some places.

The Falcon soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. The present vegetation in most areas is mainly ponderosa pine, serviceberry, and Gambel oak. Typically, the surface layer is brown gravelly sandy loam 7 inches thick. The subsoil is light brown fine sandy loam 10 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Falcon soil is moderately rapid. Available water capacity is 1 to 2 inches. Water supplying capacity is 3 to 7 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Bond soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. The present vegetation in most areas is mainly pinyon, Utah juniper, and Wyoming big sagebrush. Typically, the surface layer is brown loam 5 inches thick. The subsoil

is brown sandy clay loam 8 inches thick. Sandstone is at a depth of 13 inches. Depth to bedrock ranges from 10 to 20 inches. A layer of clay accumulation is at a depth of 3 to 13 inches.

Permeability of the Bond soil is moderate. Available water capacity is 2.5 to 3.0 inches. Water supplying capacity is 3.5 to 5.0 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is slight.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as wildlife habitat, woodland, and recreation areas.

The potential natural plant community on the Falcon soil is an overstory of ponderosa pine with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This unit is poorly suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the shallow soil depth, steepness of slope, and low available water capacity. Brushy plants such as Gambel oak and greenleaf manzanita compete with the natural regeneration of ponderosa pine. Conventional methods of harvesting timber generally are not suitable because of the steepness of slope.

Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

The potential natural plant community on the Bond soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are muttongrass, Nevada bluegrass, pinyon, birchleaf mountainmahogany, and black sagebrush.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees. Suitability for harvesting wood products in areas that have slopes of 30 to 70 percent is poor.

Areas of this unit that have slopes of more than 50 percent generally are not suited to grazing by livestock.

This map unit is in capability subclass VIIe, nonirrigated. The Falcon soil is in woodland suitability group 4r and in the Mountain Shallow Loam (Ponderosa Pine) woodland site. The Bond soil is in woodland suitability group 3r and in the Upland Very Steep Shallow Loam (Pinyon-Utah Juniper) woodland site.

28—Flygare loam, 5 to 25 percent slopes. This very deep, well drained soil is on mountain slopes and outwash fans in the La Sal Mountains. It formed in alluvium and till derived dominantly from intrusive igneous rock. Slopes are concave to convex and are less than 100 feet long. The present vegetation in most areas is mainly quaking aspen, subalpine fir, snowberry, and aspen peavine. Elevation is 8,700 to 10,000 feet. The average annual precipitation is 25 to 30 inches, the mean annual air temperature is 36 to 45 degrees F, and the average freeze-free period is 50 to 70 days.

Typically, the surface is covered with a mat of partially decomposed leaves and twigs 2 inches thick. The surface layer is very dark grayish brown loam 23 inches thick. The subsurface layer is light brown stony loam 13 inches thick. The subsoil is light reddish brown very stony clay loam 10 inches thick. The substratum to a depth of 60 inches or more is pink very cobbly sandy loam.

Included in this unit are about 8 percent Toone loam on remnant outwash fans under oak, 8 percent Skylick loam in landslide areas under quaking aspen, 4 percent Broad Canyon very cobbly loam on side slopes under quaking aspen, 4 percent Namon gravelly loam on north-facing side slopes of fans under Engelmann spruce, and 4 percent Leighcan cobbly loam on glacial moraines under Engelmann spruce.

Permeability of this Flygare soil is moderate. Available water capacity is about 6 to 8 inches. Water supplying capacity is 12 to 18 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The seral plant community on this unit is an overstory of aspen with a canopy of 60 percent. The understóry vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen. The potential natural plant community is an overstory of Engelmann spruce and subalpine fir.

This unit is well suited to the production of aspen.

The site index for aspen ranges from 60 to 80. The main limitation in harvesting timber is the instability of the slopes.

The suitability for grazing is good. Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIe, nonirrigated. It is in woodland suitability group 3f and in the High Mountain Stony Loam (Aspen) woodland site.

29—Flygare loam, 25 to 50 percent slopes. This very deep, well drained soil is on mountain slopes and outwash fans in the La Sal Mountains. It formed in alluvium and till derived dominantly from intrusive igneous rock. Slopes are concave to convex and are less than 100 feet long. The present vegetation in most areas is mainly quaking aspen, subalpine fir, snowberry, and peavine. Elevation is 8,700 to 10,000 feet. The average annual precipitation is 25 to 30 inches, the mean annual air temperature is 36 to 45 degrees F, and the average freeze-free period is 50 to 70 days.

Typically, the surface is covered with a mat of partially decomposed leaves and twigs 1 inch thick. The surface layer is very dark grayish brown loam 26 inches thick, and the lower part is very dark grayish brown very cobbly loam 8 inches thick. The subsurface layer is pale brown cobbly loamy sand 8 inches thick. The upper part of the subsoil is mixed light brown sandy loam and yellowish red loam 15 inches thick, and the lower part to a depth of 60 inches or more is reddish brown sandy clay loam.

Included in this unit are 10 percent Toone loam on remnant outwash fans under oak, 5 percent Namon gravelly loam on moraine side slopes under Engelmann spruce, 5 percent Broad Canyon very cobbly loam on mountain side slopes under quaking aspen, 5 percent Skylick loam in landslide areas under quaking aspen, and 5 percent Sirref loam on ridge crests under mountain big sagebrush.

Permeability of this Flygare soil is moderate. Available water capacity is about 6.5 to 9.0 inches. Water supplying capacity is 14 to 19 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The seral plant community on this unit is an overstory of aspen with a canopy of 60 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen. The potential natural plant community is an overstory of Engelmann spruce and subalpine fir.

This unit is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. The main concerns in harvesting timber are the hazard of erosion and the steepness of slope, which limits the use of equipment.

The suitability for grazing is good. Management practices that maintain or improve the understory vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 3r and in the High Mountain Stony Loam (Aspen) woodland site.

30—Frolic loam, 2 to 6 percent slopes. This very deep, moderately well drained soil is on valley bottoms in Old La Sal Valley and Kirks Basin. It formed in alluvium derived dominantly from intrusive igneous and mixed sedimentary rock. Slopes are less than 100 feet long and are concave. The present vegetation in most areas is mainly lupine, big sagebrush, and needleandthread. Elevation is 7,100 to 7,800 feet. The average annual precipitation is 16 to 18 inches, the mean annual air temperature is 43 to 45 degrees F, and the average freeze-free period is 80 to 100 days.

Typically, the surface layer is dark brown loam 34 inches thick. The underlying material to a depth of 60 inches or more is brown loam and fine sandy loam.

Included in this unit are 15 percent Windwhistle very fine sandy loam on side slopes adjacent to alluvial bottoms in Kirks Basin under Wyoming big sagebrush; 10 percent Waas very fine sandy loam on side slopes adjacent to alluvial bottoms near the town of La Sal; 5 percent very deep, somewhat poorly drained, loamy soils; and 5 percent deep, very poorly drained, loamy soils in depressional areas where water is at the soil surface most of the year.

Permeability of the Frolic soil is moderate. Available water capacity is about 7.5 to 10.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to long periods of flooding in April through June. A seasonal high water table is at a depth of 35 to 60 inches in March through July.

This unit is used as irrigated cropland, rangeland, and urban development.

The potential natural plant community on this unit is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are bluegrass, wheatgrass, needleandthread, brome, mountain big sagebrush, and snowberry.

Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is good. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa.

Principal crops grown under irrigation are alfalfa, pasture, and small grain. Average yields per acre per year that can be expected under a high level of management are 3 to 4 tons of alfalfa, 50 bushels of oats or barley, and 3 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

Winter wheat and spring wheat are the principal nonirrigated crops. Average yields per acre per year that can be expected under a high level of management are 20 to 22 bushels of winter wheat and 14 to 16 bushels of spring wheat. The main limitations are droughtiness, the hazard of soil blowing, and the hazard of erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Soil blowing can be reduced by returning crop residue to the soil and practicing minimum tillage. Erosion can be reduced by seeding grain early in fall, using stubble mulch tillage, and tilling and seeding on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

If this unit is used for homesite development, the main limitations are the hazard of flooding and the seasonal high water table. Drainage is needed if roads and building foundations are constructed. Flooding can be controlled only by use of major flood control structures. Septic tank absorption fields can fail during the periods when the water table is high.

This map unit is in capability subclass IIIw, irrigated and nonirrigated. It is in the Mountain Loam range site.

31—Fughes loam, 4 to 10 percent slopes. This very deep, well drained soil is in landslide areas and on solifluction lobes in the La Sal Mountains. It formed in colluvium derived dominantly from shale and intermediate igneous rock. Slopes commonly are 100 to 300 feet long and dominantly face northeast. The present vegetation in most areas is mainly mountain big sagebrush, rubber rabbitbrush, yarrow, and lupine. Elevation is 8,200 to 8,400 feet. The average annual precipitation is 18 to 22 inches, the mean annual air temperature is 42 to 44 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface layer is dark brown loam 8 inches thick. The upper 30 inches of the subsoil is reddish brown clay loam and silty clay loam, and the lower part to a depth of 60 inches or more is yellowish red sandy clay. A layer of clay accumulation is at a depth of 21 inches.

Included in this unit are small areas of Sirref loam on fan back slopes; Sirref very cobbly loam on fan side slopes; and Frolic loam on alluvial bottoms.

Permeability of the Fughes soil is slow. Available water capacity is about 9 to 10 inches. Water supplying capacity is 12 to 18 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 2 to 4 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are bluegrass, wheatgrass, needleandthread, brome, mountain big sagebrush, and snowberry.

Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is good. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa.

This map unit is in capability subclass IVe, nonirrigated. The Fughes soil is in the Mountain Loam range site.

32—Gullied land. This map unit consists of areas in Fisher Valley where the soil has been removed by water, resulting in a network of *V*-shaped or *U*-shaped channels. The gullies are 40 to 200 feet deep. Slopes are steep to extremely steep and are less than 100 feet

to more than 300 feet long. Vegetation is very sparse, consisting mainly of annual forbs and grasses.

Included in this unit are small areas of Typic Ustifluvents along the gully bottoms.

This map unit is in capability subclass VIII. It is not assigned to a range site.

33—Hagerman very fine sandy loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on structural benches in Lisbon Valley and Coyote Wash. It formed in eolian deposits derived dominantly from sandstone. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly Wyoming big sagebrush, broom snakeweed, globemallow, and blue grama. Elevation is 5,500 to 6,500 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown very fine sandy loam about 3 inches thick. The upper 5 inches of the subsoil is yellowish red very fine sandy loam, and the lower 10 inches is brown sandy clay loam. The substratum is brown and strong brown sandy clay loam 15 inches thick. Sandstone is at a depth of 33 inches. Depth to bedrock ranges from 20 to 40 inches.

Included in this unit are 15 percent Cahona fine sandy loam on structural benches, 12 percent Bond fine sandy loam on structural benches under pinyon and juniper, 5 percent Rizno fine sandy loam on structural benches under pinyon and juniper, and 3 percent Rock outcrop.

Permeability of the Hagerman soil is moderate. Available water capacity is about 5.5 to 6.0 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, irrigated and nonirrigated cropland, and recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, seeding, brush management, and proper location of water developments.

Suitability for rangeland seeding is fair. The main limitations are the low annual precipitation and moderate depth to bedrock. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

Principal crops grown under irrigation are alfalfa and small grain. Average yields per acre per year that can be expected under a high level of management are 5 to 6 tons of alfalfa and 70 to 80 bushels of barley or oats. A suitable rotation is one that includes 6 to 8 years of alfalfa and 2 or 3 years of small grain. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

Spring wheat and winter wheat are the principal nonirrigated crops. Average yields per acre per year that can be expected under a high level of management are 16 to 20 bushels of winter wheat and 10 to 14 bushels of spring wheat. The main limitations are droughtiness, the hazard of soil blowing, and the hazard of erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage. Erosion can be reduced by seeding grain early in fall, using stubble mulch tillage, and tilling and seeding on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

If this unit is used for homesite development, the main limitations are depth to bedrock and the hazard of erosion. Bedrock must be excavated for construction of buildings with basements. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health.

This map unit is in capability subclasses IVe, irrigated, and VIe, nonirrigated. It is in the Upland Loam range site.

34—Hangdo loam, 3 to 15 percent slopes. This very deep, well drained soil is on ballenas in the foothills of the La Sal Mountains. It formed in eolian deposits overlying and mixed with alluvium derived dominantly from sandstone, shale, and diorite. Slopes are less than 100 feet long and are convex. The present vegetation in most areas is mainly Gambel oak, Wyoming big sagebrush, and snowberry. Elevation is 7,200 to 8,300 feet. The average annual precipitation is 15 to 18 inches, the mean annual air temperature is 42 to 43 degrees F, and the average freeze-free period is 80 to 100 days.

Typically, the surface layer is dark reddish brown loam 11 inches thick. The upper 9 inches of the subsoil is reddish brown loam, the next 15 inches is reddish brown sandy clay loam, and the lower part to a depth of 60 inches or more is light reddish brown cobbly sandy clay loam.

Included in this unit are 10 percent Waas very fine sandy loam on fan back slopes under mountain big sagebrush, 5 percent Kilfoil Variant cobbly loam on the leeward side slopes of dissected fans, 5 percent Hangdo cobbly loam on fan side slopes, and 5 percent Frolic loam on drainage bottoms under mountain big sagebrush.

Permeability of the Hangdo soil is moderately slow. Available water capacity is about 8.5 to 10.0 inches. Water supplying capacity is 9 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used as wildlife habitat, rangeland, recreation areas, and urban development.

The potential natural plant community on this unit is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment. Gambel oak is very difficult to eradicate, and regrowth after treatment can be expected.

Suitability for rangeland seeding is fair. The main limitation is slope. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

If this unit is used for urban development, the main limitations are slope, moderately slow permeability, and the hazard of erosion. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. If the soil in this unit is used for septic tank absorption fields, the limitation of moderately slow permeability can be overcome by increasing the size of the absorption field. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Access roads should be designed to provide adequate cut-slope grade, and drains are needed to control surface runoff and keep soil losses to a minimum.

This map unit is in capability subclass IVe, nonirrigated. It is in the Mountain Loam (Oak) range site.

35—Hangdo cobbly loam, 3 to 25 percent slopes. This very deep, well drained soil is on the sides of outwash fans in the foothills of the La Sal Mountains. It formed in alluvium derived dominantly from sandstone, shale, and diorite. Slopes are less than 100 feet long and are convex. The present vegetation in most areas is mainly Gambel oak, snowberry, and Wyoming big sagebrush. Elevation is 7,200 to 8,300 feet. The average annual precipitation is 15 to 18 inches, the mean annual air temperature is 42 to 43 degrees F, and the average freeze-free period is 80 to 100 days.

Typically, the surface layer is dark brown cobbly loam 9 inches thick. The upper 7 inches of the subsoil is dark brown loam, the next 7 inches is brown cobbly sandy clay loam, and the lower 11 inches is brown very cobbly sandy clay loam. The substratum to a depth of 60 inches or more is brown very cobbly sandy loam.

Included in this unit are 10 percent Waas very fine sandy loam on fan summits under mountain big sagebrush, 5 percent Hangdo loam on ballenas, 5 percent Harpole Variant cobbly loam on side slopes under mountain big sagebrush, and 5 percent Frolic loam on drainage bottoms under mountain big sagebrush.

Permeability of this Hangdo soil is moderately slow. Available water capacity is about 6.5 to 8.5 inches. Water supplying capacity is 8 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as wildlife habitat, rangeland, and recreation areas.

The potential natural plant community on this unit is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is poor. The main limitation is slope. Plants suitable for seeding include adapted native plants and smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

This map unit is in capability subclass VIe, nonirrigated. It is in the Mountain Loam (Oak) range site.

36—Harpole very cobbly loam, 25 to 60 percent slopes. This very deep, well drained soil is on south-facing mountainsides in the La Sal Mountains. It formed in alluvium and colluvium derived dominantly from sandstone, shale, and diorite. Slopes are less than 100 feet long. The present vegetation in most areas is mainly Gambel oak, Wyoming big sagebrush, snowberry, and lupine. Elevation is 7,700 to 8,900 feet. The average annual precipitation is 16 to 22 inches, the mean annual air temperature is 44 to 45 degrees F, and the average freeze-free period is 70 to 90 days.

Typically, the upper 2 inches of the surface layer is brown very cobbly loam and the lower 8 inches is brown cobbly loam. The upper 5 inches of the subsoil is brown cobbly sandy loam, and the lower 23 inches is reddish brown and yellowish red very cobbly sandy clay loam. The substratum to a depth of 60 inches or more is yellowish red very cobbly loamy sand.

Included in this unit are 10 percent Hangdo cobbly loam on east-facing side slopes, 5 percent Skylick loam on northeast-facing side slopes and fluves under quaking aspen, 5 percent Falcon gravelly sandy loam on side slopes under ponderosa pine, and 5 percent Broad Canyon soils under Thurber fescue.

Permeability of this Harpole soil is moderately slow. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 7 to 10 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, Gambel oak, snowberry, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are steepness of slope and rock fragments in the surface layer.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Mountain Loam (Oak) range site.

37—Herm clay loam, 8 to 20 percent slopes. This very deep, well drained soil is on mountain foot slopes between Lackey Canyon and La Sal Creek, in the southern part of the La Sal Mountains. It formed in slopewash and colluvium derived dominantly from granodiorite and mixed sedimentary rock. Slopes are less than 100 feet long. The present vegetation in most areas is mainly Gambel oak, snowberry, mountain big sagebrush, and muttongrass. Elevation is 7,900 to 8,600 feet. The average annual precipitation is 20 to 22 inches, the mean annual air temperature is 39 to 42 degrees F, and the average freeze-free period is 70 to 90 days.

Typically, the surface layer is dark grayish brown clay loam 8 inches thick. The upper 6 inches of the subsoil is grayish brown clay loam, and the lower 28 inches is yellowish brown clay and clay loam. The substratum to a depth of 60 inches or more is light olive brown clay loam.

Included in this unit are 10 percent Kilfoil Variant cobbly loam on west-facing slopes, 5 percent Skylick loam along drainageways and on north-facing slopes under quaking aspen, and 5 percent Hangdo cobbly loam on partial ballenas.

Permeability of this Herm soil is very slow. Available water capacity is about 9.5 to 10.5 inches. Water supplying capacity is 15 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is

35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is fair. The main limitation is slope. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

This map unit is in capability subclass VIe, nonirrigated. It is in the Mountain Loam (Oak) range site.

38—Herm-Iles stony loams, 3 to 25 percent slopes. This map unit is on the side slopes of landslide areas and on toe slopes in the La Sal Mountains. Slopes are convex to concave and are 50 to 100 feet long. Elevation is 7,500 to 8,200 feet. The average annual precipitation is 16 to 20 inches, the mean annual air temperature is 40 to 43 degrees F, and the average freeze-free period is 75 to 90 days.

This unit is 55 percent Herm stony loam, 3 to 25 percent slopes, on concave slopes; 25 percent Iles stony loam, 3 to 25 percent slopes, on convex slopes; and 20 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 5 percent Fughes loam on solifluction lobes under mountain big sagebrush, 5 percent Herm clay loam on foot slopes under oak, 5 percent Tomasaki loam on outwash fans under ponderosa pine, and 5 percent Frolic loam on fluve bottoms under mountain big sagebrush.

The Herm soil is very deep and well drained. It formed in colluvium derived dominantly from shale and sandstone. The present vegetation in most areas is mainly Gambel oak, serviceberry, snowberry, and lupine. Typically, the upper 4 inches of the surface layer is dark brown stony loam and the lower 6 inches is brown clay loam. The upper 24 inches of the subsoil is brown clay, and the lower part to a depth of 60 inches or more is light brown clay.

Permeability of the Herm soil is very slow. Available water capacity is about 9.5 to 10.5 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Iles soil is very deep and well drained. It formed in residuum and colluvium derived dominantly from shale and sandstone. The present vegetation in most areas is mainly mountain big sagebrush, snowberry, and grasses. Slopes are convex and are less than 100 feet long. Typically, the upper 2 inches of the surface layer is dark brown stony loam and the lower 5 inches is dark brown clay loam. The subsoil is brown silty clay about 25 inches thick. The substratum to a depth of 60 inches or more is light brownish gray silty clay loam.

Permeability of the Iles soil is slow. Available water capacity is about 10 to 11 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on the Herm soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, brush management, and proper location of water developments. Suitable brush management practices include prescribed burning and chemical spraying. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is poor. The main limitations are the stones on the surface and steepness of slope. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

The potential natural plant community on the Iles soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are wheatgrass, needleandthread, brome, mountain big sagebrush, and snowberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, brush management, and proper location of water developments. Suitable brush management practices include prescribed burning and chemical spraying.

Suitability for rangeland seeding is poor. The main limitations are the stones on the surface and steepness of slope. Plants suitable for seeding include adapted

native plants, intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa.

This map unit is in capability subclass VIe, nonirrigated. The Herm soil is in the Mountain Loam (Oak) range site, and the Iles soil is in the Mountain Loam range site.

39—Herm-Tomasaki-Falcon complex, 25 to 65 percent slopes. This map unit is on escarpments of dissected outwash fans and structural benches in the La Sal Mountains. Elevation is 7,600 to 9,200 feet. The average annual precipitation is 18 to 25 inches, the mean annual air temperature is 38 to 42 degrees F, and the average freeze-free period is 50 to 80 days.

This unit is 30 percent Herm stony loam, 25 to 50 percent slopes; 25 percent Tomasaki loam, 25 to 65 percent slopes; 20 percent Falcon gravelly sandy loam, 25 to 65 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Rock outcrop, 5 percent Flygare loam on north-facing slopes under quaking apsen, 5 percent Toone loam in landslide areas under quaking aspen, and 5 percent Herm clay loam on back slopes in landslide areas under oak.

The Herm soil is very deep and well drained. It formed in colluvium and landslide deposits derived dominantly from shale and sandstone. Slopes are 50 to 100 feet long and face south or west. The present vegetation in most areas is mainly Gambel oak, Utah serviceberry, and pinyon. Typically, the upper 4 inches of the surface layer is dark brown stony loam and the lower 6 inches is brown clay loam. The upper 24 inches of the subsoil is brown clay, and the lower part to a depth of 60 inches or more is light brown clay.

Permeability of the Herm soil is very slow. Available water capacity is about 9.5 to 10.5 inches. Water supplying capacity is 14 to 18 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Tomasaki soil is very deep and well drained. It formed in colluvium derived dominantly from interbedded shale and sandstone. Slopes are 50 to 100 feet long and face north. The present vegetation in most areas is mainly ponderosa pine, Gambel oak, and Woods rose. Typically, the surface is covered with a mat of partially decomposed leaves 2 inches thick. The surface layer is dark brown loam 11 inches thick. The upper 8 inches of the subsoil is brown clay loam, the next part is brown very cobbly clay 14 inches thick, and the lower part to a depth of 60 inches or more is brown very cobbly clay loam.

Permeability of the Tomasaki soil is slow. Available water capacity is about 8 to 9 inches. Water supplying capacity is 13 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Falcon soil is shallow and well drained. It formed in slopewash and residuum derived dominantly from sandstone and shale. Slopes are 50 to 100 feet long. The present vegetation in most areas is mainly ponderosa pine, pinyon, Utah serviceberry, and manzanita. Typically, the surface layer is brown gravelly sandy loam 7 inches thick. The subsoil is light brown sandy loam 10 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Falcon soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3 to 7 inches. Effective rooting depth is 10 to 20 inches. Organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Herm soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the steepness of slope. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

The potential natural plant community on the Tomasaki soil is an overstory of ponderosa pine with a canopy of 30 percent. The understory vegetation is 45 percent grasses, 20 percent forbs, and 35 percent shrubs. Important plants are Gambel oak, muttongrass, elk sedge, and bottlebrush squirreltail.

This soil is well suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. Brushy plants, such as Gambel oak, and grasses limit natural regeneration of ponderosa pine. Hand

planting of nursery stock is usually necessary to establish or improve a stand. Conventional methods of harvesting timber generally are not suitable because of the steepness of slope.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

The potential natural plant community on the Falcon soil is an overstory of ponderosa pine with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This soil is well suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the steepness of slope, the shallow soil depth, and the very low available water capacity. Brushy plants such as Gambel oak and greenleaf manzanita limit natural regeneration of ponderosa pine. Conventional methods of harvesting timber generally are not suitable because of the steepness of slope.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIIs, nonirrigated. The Herm soil is in the Mountain Loam (Oak) range site. The Tomasaki soil is in woodland suitability group 4r and in the Mountain Loam (Ponderosa Pine) woodland site. The Falcon soil is in woodland suitability group 4r and in the Mountain Shallow Loam (Ponderosa Pine) woodland site.

40—Hoskinnini very gravelly fine sandy loam, 0 to 8 percent slopes. This shallow, well drained soil is on structural benches along the Colorado River, southwest of Moab (fig. 2). It formed in residuum derived dominantly from limestone and shale. Slopes are concave and are less than 100 feet long. The present vegetation in most areas is mainly shadscale, galleta, buckwheat, and globemallow. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 6 to 8 inches, the mean annual air temperature is 52 to 55 degrees F, and the average freeze-free period is 160 to 180 days.

Typically, the surface layer is reddish yellow very gravelly fine sandy loam about 2 inches thick. The subsoil is reddish brown loam about 5 inches thick. The substratum to a depth of 16 inches is yellowish red cobbly clay loam. Limestone is at a depth of 16 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are 10 percent Rock outcrop and 10 percent Moenkopie gravelly loamy sand on benches under blackbrush.

Permeability of the Hoskinnini soil is moderate. Available water capacity is about 1.5 to 2.5 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are galleta, shadscale, Mormon tea, and Indian ricegrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth and low annual precipitation. Plants suitable for seeding are native plants and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Desert Shallow Sandy Loam range site.

41—Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes. This map unit is on structural benches and cuestas on Harts Point, Hatch Point, and the Dark Canyon Plateau. The present vegetation in most areas is mainly big sagebrush, blue grama, yellowbrush, and Indian ricegrass. Elevation is 5,800 to 6,800 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 100 to 130 days.

This unit is 40 percent Ignacio fine sandy loam, 2 to 6 percent slopes; 35 percent Leanto fine sandy loam, 2 to 6 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Begay fine sandy loam, moist, on eolian sheets under Wyoming big sagebrush, 6 percent Mido loamy fine sand on sand drifts under fourwing saltbush, 3 percent Windwhistle very fine sandy loam in shallow depressional areas under grasses, 4 percent Rizno fine sandy loam on cuesta floors under pinyon and juniper, and 2 percent Rock outcrop.

Figure 2.—Area of Hoskinnini very gravelly fine sandy loam, 0 to 8 percent slopes, on a low structural bench.

The Ignacio soil is moderately deep and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long and are concave to convex. Typically, the surface layer is yellowish red fine sandy loam 2 inches thick. The subsoil is yellowish red fine sandy loam 17 inches thick. The substratum to a depth of 32 inches is yellowish red fine sandy loam. Sandstone is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Ignacio soil is moderately rapid. Available water capacity is about 3.5 to 4.0 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Leanto soil is shallow and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are less than 100 feet long and are concave to convex. Typically, the surface layer is yellowish red fine sandy loam 1 inch thick. The subsoil is yellowish red fine sandy loam 14 inches thick. Sandstone is at a depth of 15 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Leanto soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 2.0 to 3.5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Ignacio soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water

developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is poor. The main limitations are the moderate depth to bedrock and low available water capacity. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

The potential natural plant community on the Leanto soil is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Important plants are Nevada bluegrass, black sagebrush, birchleaf mountainmahogany, and blue grama.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the very low available water capacity and the shallow soil depth. Plants suitable for seeding are native plants, intermediate wheatgrass, yellow sweetclover, and pubescent wheatgrass.

This map unit is in capability subclass VIIs, nonirrigated. The Ignacio soil is in the Upland Loam range site, and the Leanto soil is in the Upland Shallow Loam range site.

42—Ignacio-Leanto fine sandy loams, dry, 2 to 6 percent slopes. This map unit is on structural benches and cuestas on Hatch Point, Flat Iron Mesa, and Leanto Point. The present vegetation in most areas is mainly fourwing saltbush, winterfat, blue grama, and galleta. Elevation is 5,000 to 5,800 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 50 to 52 degrees F, and the average freeze-free period is 130 to 150 days.

This unit is 40 percent Ignacio fine sandy loam, dry, 2 to 6 percent slopes; 30 percent Leanto fine sandy loam, dry, 2 to 6 percent slopes; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Begay fine sandy loam on eolian sheets under grasses; 7 percent Mido loamy fine sand, dry, on sand drifts under fourwing saltbush; 3 percent Windwhistle very fine sandy loam in shallow depressional areas under grasses; 4 percent Rizno gravelly fine sandy loam, dry, on cuesta floors under juniper and pinyon; and 4 percent Rock outcrop.

The Ignacio soil is moderately deep and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long and are concave to convex. Typically, the surface layer is yellowish red fine sandy loam 2 inches thick. The subsoil is yellowish red fine sandy loam 17 inches thick. The substratum to a depth of 32 inches is yellowish red fine sandy loam. Sandstone is at a depth of 32 inches. Depth to bedrock ranges from 20 to 40 inches.

Permeability of the Ignacio soil is moderately rapid. Available water capacity is about 3.5 to 4.0 inches. Water supplying capacity is 3.0 to 4.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Leanto soil is shallow and well drained. It formed in eolian deposits derived dominantly from sandstone. Slopes are 50 to 100 feet long and are concave to convex. Typically, the surface layer is yellowish red fine sandy loam 1 inch thick. The subsoil is yellowish red fine sandy loam 14 inches thick. Sandstone is at a depth of 15 inches. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Leanto soil is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 1.5 to 3.0 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Ignacio soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitations are the low annual precipitation, moderate depth to bedrock, and low available water capacity. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

The potential natural plant community on the Leanto soil is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Important plants are shadscale, Indian ricegrass, galleta, Bigelow sagebrush, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use,

planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth and very low available water capacity. Plants suitable for seeding are native plants and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Ignacio soil is in the Semidesert Sandy Loam range site, and the Leanto soil is in the Semidesert Shallow Sandy Loam range site.

43—Jocity loam, 2 to 4 percent slopes. This very deep, well drained soil is on alluvial flood plains in Castle Valley. It formed in alluvium derived dominantly from sedimentary rock. Slopes are concave and are less than 100 feet long. The vegetation in areas not cultivated is mainly basin big sagebrush, rabbitbrush, cheatgrass, and basin wildrye. Elevation is 4,400 to 4,800 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 55 degrees F, and the average freeze-free period is 140 to 160 days.

Typically, the surface layer is reddish brown loam 10 inches thick. The underlying material is red sandy loam and clay loam 25 inches thick. Below this is a buried surface layer of reddish brown loam 14 inches thick. The next layer to a depth of 60 inches or more is stratified, red and reddish brown loam and clay loam.

Included in this unit are 6 percent Nakai fine sand under fourwing saltbush, 6 percent Barnum silty clay loam under black greasewood, 6 percent Thoroughfare loam under black greasewood, 4 percent Moab gravelly fine sandy loam under blackbrush, and 4 percent Ustic Torrifluvents. The included soils are on valley bottoms and terraces.

Permeability of the Jocity soil is moderately slow. Available water capacity is about 9 to 10 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used as irrigated cropland, rangeland, and urban development.

The potential natural plant community on this unit is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Important plants are blue grama, basin big sagebrush, western wheatgrass, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the low annual precipitation. Plants suitable for seeding are native plants and prostrate kochia.

Principal crops grown under irrigation are alfalfa, corn, small grain, peaches, pears, apples, and melons. Average yields per acre per year that can be expected under a high level of management are 8 tons of alfalfa, 80 to 100 bushels of corn, 20 tons of corn silage, 100 bushels of oats or barley, 400 to 500 bushels of peaches, 14 tons of cantaloup, and 18 tons of watermelon. Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. For the efficient application and removal of irrigation water, leveling is needed in sloping areas. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

This unit is well suited to urban development. It has few limitations. In summer, irrigation is needed for lawn grasses, shrubs, vines, shade trees, and ornamental trees. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

This map unit is in capability subclasses IIe, irrigated, and VIIe, nonirrigated. It is in the Loamy Bottom range site.

44—Kilfoil Variant-Hangdo-Harpole Variant complex, 3 to 25 percent slopes. This map unit is on alluvial fan remnants and ballenas in the La Sal Mountains. Elevation is 7,600 to 8,200 feet. The average annual precipitation is 16 to 18 inches, the mean annual air temperature is 42 to 44 degrees F, and the average freeze-free period is 80 to 100 days.

This unit is 35 percent Kilfoil Variant cobbly loam, 3 to 15 percent slopes; 30 percent Hangdo loam, 3 to 15 percent slopes; 25 percent Harpole Variant cobbly loam, 8 to 25 percent slopes; and 10 percent other soils. The Kilfoil Variant soil is on the ballena crests, the Hangdo soil in shallow depressional areas, and the Harpole Variant soil is on the sides of fans. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is 10 percent very deep, well drained soils that have a thick, dark-colored loam surface layer. Also included are small areas of moderately deep, very gravelly soils that have cemented carbonates at a depth of 20 to 40 inches.

The Kilfoil Variant soil is very deep and well drained. It formed in eolian material mixed with alluvium derived dominantly from diorite. The present vegetation in most areas is mainly Gambel oak, snowberry, and lupine. Slopes are less than 100 feet long and are convex. Typically, the surface layer is brown cobbly loam 7 inches thick. The upper 22 inches of the subsoil is reddish brown and yellowish red clay loam, and the lower 17 inches is reddish brown cobbly clay loam. The substratum to a depth of 60 inches or more is pink cobbly loam.

Permeability of the Kilfoil Variant soil is moderately slow. Available water capacity is about 9 to 10 inches. Water supplying capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

The Hangdo soil is very deep and well drained. It formed in eolian deposits mixed with alluvium derived dominantly from diorite. The present vegetation in most areas is mainly Gambel oak, snowberry, and bluegrass. Slopes are less than 100 feet long and are concave. Typically, the surface layer is dark reddish brown loam 11 inches thick. The upper 9 inches of the subsoil is reddish brown loam, the next 15 inches is reddish brown sandy clay loam, and the lower part to a depth of 60 inches or more is light reddish brown cobbly sandy clay loam.

Permeability of the Hangdo soil is moderately slow. Available water capacity is about 8.5 to 10.0 inches. Water supplying capacity is 10.0 to 12.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Harpole Variant soil is very deep and well drained. It formed in alluvium derived dominantly from diorite. The present vegetation in most areas is mainly mountain big sagebrush, snowberry, and Indian paintbrush. Slopes are less than 100 feet long. Typically, the upper 5 inches of the surface layer is reddish brown cobbly loam and the lower 6 inches is very gravelly sandy clay loam. The subsoil is reddish brown very gravelly sandy clay loam 17 inches thick. The substratum to a depth of 60 inches or more is reddish brown extremely gravelly sandy clay loam.

Permeability of the Harpole Variant soil is moderate. Available water capacity is about 4 to 5 inches. Water supplying capacity is 7 to 9 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on the Kilfoil Variant and Hangdo soils is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is fair. The main limitations are the rock fragments in the surface and the hazard of erosion. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

The potential natural plant community on the Harpole Variant soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are muttongrass, needleandthread, blue grama, mountain big sagebrush, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management may be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning and chemical spraying.

Suitability for rangeland seeding is poor. Mechanical treatment is not practical because of the cobbles in the surface layer and the steepness of slope.

This map unit is in capability subclass VIe, nonirrigated. The Kilfoil Variant and Hangdo soils are in the Mountain Loam (Oak) range site, and the Harpole Variant soil is in the Mountain Stony Loam range site.

45—Leighcan cobbly loam, 25 to 50 percent slopes. This very deep, well drained soil is on mountainsides and valley trains in the La Sal Mountains. It formed in glacial till derived dominantly

from porphyritic diorite. Slopes are less than 100 feet long and are concave to convex. The present vegetation in most areas is mainly Engelmann spruce, subalpine fir, Colorado columbine, and huckleberry. Elevation is 9,400 to 10,600 feet. The average annual precipitation is 30 to 35 inches, the mean annual air temperature is 34 to 38 degrees F, and the average freeze-free period is 20 to 40 days.

Typically, the surface is covered with a mat of moss and undecomposed needles 1 inch thick. The upper part of the surface layer is brown cobbly loam 8 inches thick, and the lower part is light yellowish brown gravelly coarse sandy loam 8 inches thick. The upper part of the subsoil is yellowish brown very gravelly coarse sandy loam 21 inches thick, and the lower part to a depth of 60 inches or more is yellowish brown very cobbly coarse sandy loam.

Included in this unit are 15 percent Namon gravelly loam on lateral moraines, 10 percent Flygare loam on foot slopes under quaking aspen, and 5 percent Broad Canyon very cobbly loam on south-facing side slopes under quaking aspen.

Permeability of this Leighcan soil is moderate. Available water capacity is about 2.5 to 4.0 inches. Water supplying capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used mainly as woodland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of Engelmann spruce and subalpine fir with a canopy of 55 percent. The understory vegetation is 20 percent grasses, 5 percent forbs, and 75 percent shrubs. Important plants are vaccinium, Oregongrape, sedges, pinegrass, and gooseberry.

This unit is moderately suited to the production of Engelmann spruce and subalpine fir. The site index for Engelmann spruce is 55, and the site index for subalpine fir is 60. The main concerns in producing and harvesting timber are the steepness of slope, which limits the use of equipment; the hazard of erosion; and plant competition. Use of conventional track-type equipment is severely limited in areas that have slopes of more than 35 percent. Trees that are suitable for planting are Engelmann spruce and subalpine fir.

This unit is limited for grazing because of the low production and relative unpalatability of the understory plants.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 3r and in the High Mountain Stony Loam (Engelmann Spruce) woodland site.

46—Leighcan cobbly loam, 50 to 70 percent slopes. This very deep, well drained soil is on mountainsides in the La Sal Mountains. It formed in till or colluvium derived dominantly from porphyritic diorite. Slopes are dominantly less than 100 feet long and are convex to concave. The present vegetation in most areas is mainly Engelmann spruce, subalpine fir, Colorado columbine, and huckleberry. Elevation is 10,000 to 12,000 feet. The average annual precipitation is 30 to 40 inches, the mean annual air temperature is 32 to 37 degrees F, and the average freeze-free period is 20 to 40 days.

Typically, the surface is covered with a mat of moss and undecomposed needles 1 inch thick. The upper part of the surface layer is brown cobbly loam 8 inches thick, and the lower part is light yellowish brown gravelly coarse sandy loam 8 inches thick. The upper part of the subsoil is yellowish brown very gravelly coarse sandy loam 21 inches thick, and the lower part to a depth of 60 inches or more is yellowish brown very cobbly coarse sandy loam.

Included in this unit are 10 percent Rubble land on rock glaciers, 10 percent Meredith stony loam on exposed slopes and ridges under sedges, and 5 percent Namon gravelly loam on remnant moraines.

Permeability of this Leighcan soil is moderately rapid. Available water capacity is about 2.5 to 4.0 inches. Water supplying capacity is 10 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is severe. Soil blowing is not a hazard.

This unit is used mainly as woodland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of Engelmann spruce and subalpine fir with a canopy of 55 percent. The understory vegetation is 20 percent grasses, 5 percent forbs, and 75 percent shrubs. Important plants are vaccinium, Oregongrape, sedges, pinegrass, and gooseberry.

This unit is poorly suited to the production of Engelmann spruce and subalpine fir. The site index for Engelmann spruce is 55, and the site index for subalpine fir is 60. The main concerns in producing and harvesting timber are the steepness of slope, which limits the use of equipment, and the hazard of erosion. Use of conventional track-type equipment is severely limited by the steepness of slope. Roads and landings need to be protected from erosion by water bars and by

seeding cuts and fills. Trees that are suitable for planting are Engelmann spruce and subalpine fir.

This unit is limited for grazing because of the low production of forage and steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 3r and in the High Mountain Very Steep Stony Loam (Engelmann Spruce) woodland site.

47—Lithic Torriorthents-Badland-Rock outcrop complex, 15 to 30 percent slopes. This map unit is on structural benches and cuestas in the Dolores Triangle. Slopes are 50 to 100 feet long. Elevation is 4,200 to 5,000 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 54 degrees F, and the average freeze-free period is 150 to 170 days.

This unit is 30 percent Lithic Torriorthents, 15 to 30 percent slopes, on cuesta dip slopes; 30 percent Badland on hillsides and escarpments; 30 percent Rock outcrop on escarpments and cuesta rims; and 10 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Bluechief fine sandy loam on fan terraces under fourwing saltbush and Leeko loamy fine sand on fluves and toe slopes under black greasewood.

The Lithic Torriorthents are shallow and well drained. They formed in residuum mixed with eolian material derived dominantly from sandstone, siltstone, and shale. The present vegetation in most areas is mainly shadscale, galleta, Mormon tea, and broom snakeweed. No single profile is typical of these soils, but one commonly observed in the survey area is reddish brown sandy loam 8 inches thick over sandstone. Depth to bedrock ranges from 3 to 20 inches. These soils are sandy loam, gravelly sandy loam, gravelly loamy sand, stony loam, very stony silty clay loam, or very cobbly loam. Rock fragment content ranges from 0 to 60 percent. Rock fragment content, texture, and other soil properties vary significantly within short distances.

Permeability of the Lithic Torriorthents is moderate. Available water capacity is less than 2 inches. Water supplying capacity is 1 to 3 inches. Effective rooting depth is 3 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Badland consists of steep to very steep, barren areas of shale or shale interbedded with thin strata of sandstone. The areas of Badland are dissected by many intermittent drainageways. Local relief ranges from 25 to 500 feet. Vegetation is very sparse and is dominantly shadscale and annual forbs. Runoff is very rapid, and geologic erosion is active.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on the Lithic Torriorthents is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are galleta, shadscale, Mormon tea, and Indian ricegrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth, low annual precipitation, and very low available water capacity. Plants suitable for seeding are native plants and prostrate kochia.

The Lithic Torriorthents are in capability subclass VIIs, nonirrigated. They are in the Desert Shallow Sandy Loam range site. The Badland and Rock outcrop are in capability subclass VIII. They are not assigned to a range site.

48—Lithic Ustic Torriorthents-Badland-Rock outcrop complex, 15 to 30 percent slopes. This map unit is on structural benches and cuestas in the Dolores Triangle. Slopes are 50 to 100 feet long, convex to concave, and on south, east, and west aspects. Elevation is 5,600 to 5,900 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 30 percent Lithic Ustic Torriorthents, 15 to 30 percent slopes, on cuesta dip slopes; 30 percent Badland on cuesta escarpments; 30 percent Rock outcrop on ledges and along the crest of homoclinal ridges; and 10 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Mivida fine sandy loam on broad ledges under grasses and Hanksville clay loam on shale hillsides under shadscale.

The Lithic Ustic Torriorthents are shallow and well drained. They formed in residuum derived dominantly from sandstone and shale. The present vegetation in most areas is mainly blackbrush, Mormon tea, snakeweed, and Utah juniper. No single profile is typical of these soils, but one commonly observed in the survey area has a surface layer of yellowish red fine

sandy loam 2 inches thick. The underlying material to a depth of 14 inches is reddish brown and light reddish brown gravelly sandy clay loam, fine sandy loam, and gravelly loamy sand. Sandstone is at a depth of 14 inches. Depth to bedrock ranges from 2 to 20 inches. Rock fragment content ranges from 0 to 90 percent. Rock fragment content, texture, and other soil properties vary significantly within short distances.

Permeability of the Lithic Ustic Torriorthents is moderately rapid. Available water capacity is about 1 to 2 inches. Water supplying capacity is 1.5 to 3.0 inches. Effective rooting depth is 2 to 20 inches. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Badland consists of steep to very steep, barren areas of shale or shale interbedded with thin strata of sandstone. The areas of Badland are dissected by many intermittent drainageways. Local relief ranges from 25 to 500 feet. Vegetation is very sparse and is dominantly shadscale and annual forbs. Runoff is very rapid, and geologic erosion is active.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on the Lithic Ustic Torriorthents is 15 percent grasses, 10 percent forbs, and 75 percent shrubs. Important plants are blackbrush, Indian ricegrass, galleta, and Torrey Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are slope, the shallow soil depth, and very low available water capacity.

The Lithic Ustic Torriorthents are in capability subclass VIIs, nonirrigated. They are in the Semidesert Shallow Sandy Loam (Blackbrush) range site. The Badland and Rock outcrop are in capability subclass VIII. They are not assigned to a range site.

49—Meredith stony loam, 20 to 70 percent slopes. This very deep, well drained soil is on mountain peaks and in cirque basins above the timberline in the La Sal Mountains. This soil formed in mixed eolian deposits and slope alluvium overlying rubble colluvium derived dominantly from porphyritic diorite. Slopes are 100 to 300 feet long and are concave to convex. The present vegetation in most areas is mainly alpine clover, western yarrow, shrubby cinquefoil, and sedges. Elevation is 10,500 to 12,700 feet. The average annual precipitation is 30 to 35 inches, the mean annual air temperature is 26 to 28 degrees F, and the average freeze-free period is 5 to 20 days.

Typically, the surface is covered with a mat of undecomposed and decomposed organic material, mainly alpine grasses and forbs, 1 inch thick. The surface layer is brown stony loam 7 inches thick. The subsoil is brown very cobbly loam 6 inches thick. The upper 8 inches of the substratum is brown extremely cobbly sandy clay loam, and the lower part to a depth of 60 inches or more is about 80 percent rock fragments, 5 percent soil material, and 15 percent voids. Depth to the fragmental part of the substratum ranges from 20 to 40 inches.

Included in this unit are 15 percent Rubble land, 10 percent Leighcan cobbly loam under Engelmann spruce, and 5 percent Broad Canyon very stony loam on south-facing slopes under Thurber fescue.

Permeability of this Meredith soil is moderately rapid. Available water capacity is 3 to 4 inches. Water supplying capacity is 10.5 to 13.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is severe. Soil blowing is not a hazard.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 25 percent forbs, and 25 percent shrubs. Important plants are sedge, alpine, Bellard alpinesedge, alpine clover, willow, tufted hairgrass, and wheatgrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use and a planned grazing system.

Suitability for rangeland seeding is very poor. The main limitations are the short growing season and steepness of slope.

The suitability for grazing is poor for cattle and fair for sheep.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Alpine Slope range site.

50—Mido loamy fine sand, 2 to 8 percent slopes. This very deep, well drained soil is on sand drifts and sand shadows on benches and cuestas in Dry Valley. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly sand sagebrush and grasses. Elevation is 6,100 to 6,400 feet. The average annual precipitation is 12 to 14

inches, the mean annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 110 to 130 days.

Typically, the surface layer is light brown loamy fine sand 3 inches thick. The upper 24 inches of the underlying material is yellowish red and light reddish brown loamy fine sand, and the lower part to a depth of 60 inches or more is light reddish brown, light brown, and reddish yellow fine sand.

Included in this unit are 17 percent Begay fine sandy loam on eolian sheets under fourwing saltbush and 8 percent moderately deep sandy soils.

Permeability of the Mido soil is rapid. Available water capacity is about 4 to 6 inches. Water supplying capacity is 4.5 to 8.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 60 percent grasses, 5 percent forbs, and 35 percent shrubs. Important plants are dropseed, blue grama, needleandthread, Indian ricegrass, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning and chemical spraying.

Suitability for rangeland seeding is poor. The main limitations are the hazard of soil blowing and the loamy fine sand texture of the surface layer. Plants suitable for seeding include adapted native plants, pubescent wheatgrass, intermediate wheatgrass, crested wheatgrass, alfalfa, and small burnet.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Upland Sand range site.

51—Mido loamy fine sand, dry, 2 to 8 percent slopes. This very deep, well drained soil is on sand drifts and sand shadows on mesas and cuestas on Hatch Point, on Flat Iron Mesa, and in Dry Valley. It formed in sandy eolian deposits derived dominantly from sandstone. Slopes are less than 100 to 300 feet long. The present vegetation in most areas is mainly fourwing saltbush, blue grama, galleta, and Mormon tea. Elevation is 5,500 to 6,000 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is light brown loamy fine sand 3 inches thick. The upper 24 inches of the underlying material is yellowish red and light reddish brown loamy fine sand, and the lower part to a depth of 60 inches or more is light reddish brown, light brown, and reddish yellow fine sand.

Included in this unit are 15 percent Begay fine sandy loam on eolian sheets; 5 percent Rock outcrop; 5 percent Ignacio fine sandy loam, dry, on structural benches; and 3 percent Arches fine sand that is adjacent to the areas of Rock outcrop and is under blackbrush.

Permeability of the Mido soil is rapid. Available water capacity is about 4 to 6 inches. Water supplying capacity is 4.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 50 percent grasses, 15 percent forbs, and 35 percent shrubs. Important plants are Indian ricegrass, needleandthread, Mormon tea, dropseed, fourwing saltbush, and sandhill muhly.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Chemical spraying and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is poor. The main limitations are the loamy fine sand texture of the surface layer, the high hazard of soil blowing, and the low annual precipitation. Plants suitable for seeding include fourwing saltbush, Indian ricegrass, sand dropseed, and other native plants.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Semidesert Sand range site.

52—Mivida fine sandy loam, 2 to 8 percent slopes. This deep, well drained soil is on cuestas along Indian Creek, in the Harts Point area. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly galleta, blue grama, Mormon tea, and fourwing saltbush. Elevation is 5,000 to 5,400 feet. The average annual precipitation is 9 to 11 inches, the mean annual air temperature is 51 to 53 degrees F, and the average freeze-free period is 140 to 150 days.

Typically, the surface layer is yellowish red fine sandy loam 4 inches thick. The subsoil is yellowish red fine sandy loam 11 inches thick. The substratum is pink

and reddish yellow fine sandy loam 28 inches thick. Sandstone is at a depth of 43 inches. A layer of carbonate accumulation is at a depth of 15 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are small areas of Redbank fine sandy loam, dry, on fluves and Begay fine sandy loam on benches.

Permeability of the Mivida soil is moderately rapid. Available water capacity is about 4 to 6 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 40 to 60 inches. The organic matter content of the surface layer is 1 to 2 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Semidesert Sandy Loam range site.

53—Moab gravelly fine sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on alluvial valley bottoms and alluvial fans in Spanish Valley and Castle Valley. It formed in alluvium derived dominantly from sandstone, shale, and intrusive igneous rock. Slopes are convex to concave and are 100 to 300 feet long. The present vegetation in most areas is mainly Indian ricegrass, galleta, blackbrush, and fourwing saltbush. Elevation is 4,600 to 5,800 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 52 degrees F, and the average freeze-free period is 120 to 150 days.

Typically, the surface layer is brown gravelly fine sandy loam about 3 inches thick. The subsoil is brown gravelly fine sandy loam about 7 inches thick. The substratum to a depth of 60 inches or more is pinkish white and pink very gravelly fine sandy loam.

Included in this unit are 5 percent Factory gravelly fine sandy loam, moist, under Wyoming big sagebrush and 5 percent Bluechief fine sandy loam under grasses. These soils are on terraces.

Permeability of the Moab soil is moderately rapid. Available water capacity is about 4 to 5 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as rangeland, irrigated cropland, wildlife habitat, urban development, and recreation areas.

The potential natural plant community on this unit is 40 percent grasses, 10 percent forbs, and 50 percent shrubs. Important plants are blackbrush, galleta, and Indian ricegrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation.

Principal crops grown under irrigation are alfalfa, small grain, and pasture. Average yields per acre per year that can be expected under a high level of management are 6 tons of alfalfa, 80 bushels of oats or barley, and 5 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. The main limitations for growing crops are the moderately low available water capacity and gravel on the surface. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Tillage should be kept to a minimum. All tillage should be on the contour or across the slope.

If this unit is used for homesite development, the main limitation is the content of rock fragments. Topsoil can be stockpiled and used to reclaim areas disturbed during construction. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination

of water supplies as a result of seepage from onsite sewage disposal systems.

This map unit is in capability subclasses IIIs, irrigated, and VIIs, nonirrigated. It is in the Semidesert Stony Loam (Blackbrush) range site.

54—Moab very cobbly fine sandy loam, 3 to 30 percent slopes. This very deep, well drained soil is on alluvial fans and terrace side slopes in Spanish Valley. It formed in alluvium derived dominantly from sandstone and diorite. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly Indian ricegrass, galleta, blackbrush, and fourwing saltbush. Elevation is 5,200 to 6,000 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is yellowish red very cobbly fine sandy loam about 2 inches thick. The subsoil is yellowish red gravelly fine sandy loam about 8 inches thick. The upper 7 inches of the substratum is pink very gravelly fine sandy loam, the next 30 inches is reddish yellow and yellowish red very gravelly fine sandy loam, and the lower part to a depth of 60 inches or more is red very gravelly fine sandy loam.

Included in this unit are small areas of Redbank very fine sandy loam on valley bottoms under black greasewood.

Permeability of the Moab soil is moderately rapid. Available water capacity is about 4.0 to 3.5 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 40 percent grasses, 10 percent forbs, and 50 percent shrubs. Important plants are blackbrush, galleta, and Indian ricegrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitations are the steepness of slope, the rock fragments on the surface, and the low annual precipitation.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Semidesert Stony Loam (Blackbrush) range site.

55—Moab-Rizno gravelly fine sandy loams, 2 to 15 percent slopes. This map unit is on strath terraces along the Colorado River, in the Dolores Triangle. Elevation is 4,400 to 4,800 feet. The average annual precipitation is 9 to 11 inches, the mean annual air temperature is 51 to 53 degrees F, and the average freeze-free period is 130 to 150 days.

This unit is 40 percent Moab gravelly fine sandy loam, 2 to 8 percent slopes, on alluvial terraces; 30 percent Rizno gravelly fine sandy loam, 3 to 15 percent slopes, on structural bench floors; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent Moab very cobbly fine sandy loam on terrace side slopes under blackbrush, 10 percent Mivida fine sandy loam on low river terraces under fourwing saltbush, and 5 percent Mido loamy fine sand, dry, on sand drifts and sand shadows under fourwing saltbush.

The Moab soil is very deep and well drained. It formed in alluvium derived dominantly from mixed sedimentary and igneous rock. Slopes are convex to concave and are 100 to 300 feet long. The present vegetation in most areas is mainly Indian ricegrass, galleta, blackbrush, and fourwing saltbush. Typically, the surface layer is brown gravelly fine sandy loam about 3 inches thick. The subsoil is brown gravelly fine sandy loam about 7 inches thick. The substratum to a depth of 60 inches or more is pinkish white very gravelly fine sandy loam.

Permeability of the Moab soil is moderately rapid. Available water capacity is about 4 to 5 inches. Water supplying capacity is 3.5 to 5.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Rizno soil is shallow and well drained. It formed in eolian deposits over residuum derived dominantly from sandstone and shale. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly blackbrush, fourwing saltbush, Utah juniper, and galleta. Typically, the surface layer is light reddish brown gravelly fine sandy loam about 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderately rapid. Available water capacity is less than 2 inches. Water

supplying capacity is 2 to 3 inches. Effective rooting depth is 4 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Moab soil is 40 percent grasses, 10 percent forbs, and 50 percent shrubs. Important plants are blackbrush, galleta, and Indian ricegrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation.

The potential natural plant community on the Rizno soil is an overstory of Utah juniper and pinyon with a canopy of 15 percent. The understory vegetation is 20 percent grasses, 15 percent forbs, and 65 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, and Mormon tea.

The site index for Utah juniper and pinyon is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth, very low available water capacity, and low annual precipitation. Plants suitable for seeding are native plants and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Moab soil is in the Semidesert Stony Loam (Blackbrush) range site. The Rizno soil is in woodland suitability group 3d and in the Semidesert Shallow Sandy Loam (Utah Juniper-Pinyon) woodland site.

56—Moenkopie very gravelly sandy loam, 3 to 30 percent slopes. This shallow, well drained soil is on dissected benches and cuestas in Professor Valley and in other valleys adjacent to the Colorado River. It formed in residuum derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly blackbrush, green Mormon tea, shadscale, and galleta. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 6 to 9 inches, the mean annual air temperature is 52 to 55 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is yellowish red very gravelly sandy loam 1 inch thick. The underlying material to a depth of 3 inches is dark reddish brown sandy loam. Sandstone is at a depth of 3 inches. Depth to bedrock ranges from 3 to 20 inches.

Included in this unit are 10 percent moderately deep gravelly loam on foot slopes and toe slopes between dissected benches, 7 percent Nepalto gravelly sandy loam on relict stream bottoms under blackbrush, 5 percent Trail fine sand on valley bottoms under fourwing saltbush, 5 percent Thoroughfare fine sandy loam on fluves under fourwing saltbush, 5 percent Moab gravelly fine sandy loam on remnant fans under blackbrush, and 3 percent Rock outcrop. Included in Professor Valley are small areas that are more than 5 percent Thoroughfare soils.

Permeability of the Moenkopie soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is less than 2 inches. Effective rooting depth is 2 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used mainly as rangeland and wildlife habitat.

The potential natural plant community on this unit is 25 percent grasses, 5 percent forbs, and 70 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, and shadscale.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth, low annual precipitation, and very low available water capacity.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Desert Shallow Sandy Loam (Blackbrush) range site.

57—Moenkopie-Rock outcrop complex, 1 to 15 percent slopes. This map unit is on dissected benches and cuestas in Kane Springs Canyon, Lockhart Basin, and Professor Valley. Slopes are 100 to 300 feet long. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 53 to 55 degrees F, and the average freeze-free period is 150 to 170 days.

This unit is 55 percent Moenkopie gravelly loamy

sand, 1 to 15 percent slopes; 30 percent Rock outcrop; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 8 percent Trail fine sand on fluves under fourwing saltbush, 5 percent Moab gravelly fine sandy loam on remnant river terraces under blackbrush, 2 percent Arches fine sand on sand sheets under blackbrush, and small areas of Sheppard fine sand on sand drifts and sand shadows under grasses.

The Moenkopie soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. The present vegetation in most areas is mainly blackbrush, green Mormon tea, shadscale, and galleta. Typically, the surface layer is reddish brown gravelly loamy sand 3 inches thick. The underlying material to a depth of 8 inches is reddish brown sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 3 to 20 inches.

Permeability of the Moenkopie soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is less than 2 inches. Effective rooting depth is 3 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, and slickrock.

This unit is used as rangeland and wildlife habitat. A few areas are used for homesite development.

The potential natural plant community on the Moenkopie soil is 25 percent grasses, 5 percent forbs, and 70 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, shadscale, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth, low annual precipitation, and very low available water capacity.

If this unit is used for homesite development, the main limitations are the steepness of slope and shallow depth to bedrock. Buildings and roads should be designed to compensate for the shallow depth to bedrock. Septic tank absorption fields are not practical because of the steepness of slope and the shallow depth to bedrock.

This map unit is in capability subclass VIIs, nonirrigated. The Moenkopie soil is in the Desert Shallow Sandy Loam (Blackbrush) range site. The Rock outcrop is not assigned to a range site.

58—Nakai fine sand, 2 to 8 percent slopes. This very deep, well drained soil is on structural benches and mesas in Indian Creek and Lockhart Basin. It formed in eolian and alluvial deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly galleta, shadscale, Mormon tea, and broom snakeweed (fig. 3). Elevation is 4,000 to 4,900 feet. The average annual precipitation is 7 to 10 inches, the mean annual air temperature is 52 to 53 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is yellowish red fine sand 17 inches thick. The upper 10 inches of the underlying material is yellowish red fine sandy loam, and the lower part to a depth of 60 inches or more is reddish yellow fine sandy loam.

Included in this unit are 10 percent Thoroughfare fine sandy loam on fluves under fourwing saltbush, 10 percent Bluechief fine sandy loam on mesas, 10 percent Sheppard fine sand on sand drifts under grasses, 5 percent Moenkopie gravelly loamy sand adjacent to Rock outcrop under blackbrush, and 3 percent Rock outcrop.

Permeability of the Nakai soil is moderately rapid. Available water capacity is about 6 to 8 inches. Water supplying capacity is 4.5 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are galleta, fourwing saltbush, Indian ricegrass, winterfat, and dropseed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the low annual precipitation. Plants suitable for seeding are native plants and prostrate kochia.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Desert Sandy Loam range site.

59—Namon gravelly loam, 8 to 30 percent slopes. This very deep, well drained soil is on ground moraines and lateral moraines in the La Sal Mountains. It formed in glacial till derived dominantly from porphyritic diorite. Slopes are 100 to 300 feet long and are convex to concave. The present vegetation in most areas is

Figure 3.—Area of Nakai fine sand, 2 to 8 percent slopes.

mainly Engelmann spruce, subalpine fir, Colorado columbine, and huckleberry. Elevation is 9,600 to 11,000 feet. The average annual precipitation is 30 to 40 inches, the mean annual air temperature is 32 to 37 degrees F, and the average freeze-free period is 20 to 40 days.

Typically, the surface is covered with a mat of moss and undecomposed needles 2 inches thick. The surface layer is brown gravelly loam 8 inches thick. The subsurface layer is light reddish brown loam 6 inches thick. The upper 11 inches of the subsoil is pink gravelly loam, and the lower part to a depth of 60 inches or more is light reddish brown very cobbly loam. A layer of clay accumulation is at a depth of 14 inches.

Included in this unit are 8 percent Flygare loam on outwash fans under quaking aspen, 4 percent Broad Canyon very cobbly loam on south-facing side slopes under quaking aspen, 4 percent Leighcan cobbly loam on valley trains, 3 percent Richens silt loam on ground moraines under grasses, and 2 percent Herd very stony loam on relict ground moraines under Thurber fescue.

Permeability of the Namon soil is moderate. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 14 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used mainly as woodland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of Engelmann spruce and subalpine fir with a canopy of 55 percent. The understory vegetation is 20 percent grasses, 5 percent forbs, and 75 percent shrubs. Important plants are blueberry, Oregongrape, sedges, pinegrass, and currant.

This unit is well suited to the production of Engelmann spruce and subalpine fir. The site index for Engelmann spruce is 55. The site index for subalpine fir is 60. The main concern in producing and harvesting timber is the hazard of erosion. The risk of erosion in areas disturbed by timber harvesting operations is moderate on slopes of more than 15 percent. The use of equipment is also limited on slopes of more than 15 percent. Roads and landings should be protected from erosion by constructing water bars and by seeding cuts and fills.

The seedling mortality rate is low. Trees that are suitable for planting are Engelmann spruce and subalpine fir.

The suitability for grazing is limited because of low production and relative unpalatability of the understory plants.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 3f and in the High Mountain Stony Loam (Engelmann Spruce) woodland site.

60—Namon gravelly loam, 30 to 50 percent slopes. This very deep, well drained soil is on ground moraines and lateral moraines in the La Sal Mountains. It formed in glacial till and colluvium derived dominantly from porphyritic diorite. Slopes are 100 to 300 feet long and are convex to concave. The present vegetation in most areas is mainly Engelmann spruce, subalpine fir, Colorado columbine, and huckleberry. Elevation is 9,600 to 11,000 feet. The average annual precipitation is 30 to 40 inches, the mean annual air temperature is 32 to 37 degrees F, and the average freeze-free period is 20 to 40 days.

Typically, the surface is covered with a mat of moss and undecomposed needles 2 inches thick. The surface layer is brown gravelly loam about 8 inches thick. The subsurface layer is light reddish brown loam about 6 inches thick. The upper 11 inches of the subsoil is pink gravelly loam, and the lower part to a depth of 60 inches or more is light reddish brown very cobbly loam. A layer of clay accumulation is at a depth of 14 inches.

Included in this unit are 8 percent Leighcan cobbly loam on north-facing side slopes of moraines, 7 percent Flygare loam on outwash fans under quaking aspen, 4 percent Rubble land on rock glaciers, and 3 percent Broad Canyon very cobbly loam on south-facing side slopes under quaking aspen.

Permeability of this Namon soil is moderate. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 14 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is severe. Soil blowing is not a hazard.

This unit is used mainly as woodland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of Engelmann spruce and subalpine fir with a canopy of 55 percent. The understory vegetation is 20 percent grasses, 5 percent forbs, and 75 percent shrubs. Important plants are blueberry, Oregongrape, sedges, pinegrass, and currant.

This unit is well suited to the production of Engelmann spruce and subalpine fir. The site index for Engelmann spruce is 55. The site index for subalpine fir is 60. The main concerns in producing and harvesting timber are the hazard of erosion and the steepness of slope, which limits the use of equipment. The risk of erosion is severe in areas where the soil surface is exposed by timber harvesting operations. Operation of wheeled and track-type equipment is severely limited in areas that have slopes of more than 35 percent.

The seedling mortality rate is low. Trees that are suitable for planting are Engelmann spruce and subalpine fir.

The suitability for grazing is limited because of the steepness of slope and the low production and relative unpalatability of the understory plants.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 3r and in the High Mountain Stony Loam (Engelmann Spruce) woodland site.

61—Nepalto gravelly sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on canyon floors and foot slopes of talus cones in Kane Springs Canyon. It formed in colluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly blackbrush, shadscale, galleta, and rabbitbrush. Elevation is 4,000 to 4,600 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 53 to 55 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is yellowish red gravelly sandy loam 5 inches thick. The underlying material to a depth of 60 inches or more is yellowish red, stratified extremely stony loamy fine sand, extremely cobbly fine sand, and extremely gravelly fine sand.

Included in this unit are 10 percent very deep, very gravelly alluvial soils, 5 percent Thoroughfare fine sandy loam on alluvial terraces under fourwing saltbush, and 2 percent Rock outcrop.

Permeability of the Nepalto soil is rapid. Available water capacity is about 2 to 3 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland and wildlife habitat. A few areas are used for irrigated cropland and homesite development.

The potential natural plant community on this unit is 30 percent grasses, 15 percent forbs, and 55 percent shrubs. Important plants are blackbrush, galleta, shadscale, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and low available water capacity.

Principal crops grown under irrigation are alfalfa and small grain. Average yields per acre per year that can be expected under a high level of management are 6 tons of alfalfa and 80 bushels of oats or barley. A suitable rotation is one that includes 6 to 8 years of alfalfa and 2 or 3 years of small grain. Because the water intake rate is rapid, sprinkler irrigation is best suited to the soil in this unit. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Erosion can be reduced if grain is seeded early in fall, conservation tillage is used, and tillage and seeding are on the contour or across the slope. Also, waterways should be shaped and seeded to perennial grass.

If this unit is used for homesite development, the main limitations are the stoniness and rapid permeability. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns.

This map unit is in capability subclasses IVs, irrigated, and VIIs, nonirrigated. It is in the Desert Stony Loam (Blackbrush) range site.

62—Nepalto very stony sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on canyon floors and foot slopes of talus cones near the Dolores River. It formed in colluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly shadscale, blackbrush, and galleta. Elevation is 4,000 to 4,600 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 53 to 55 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is red very stony sandy loam 3 inches thick. The underlying material to a depth of 60 inches or more is stratified, red to reddish yellow gravelly fine sandy loam to very stony loamy sand.

Included in this unit are 10 percent very deep, very gravelly alluvial soils, 5 percent Thoroughfare fine sandy loam on stream terraces under fourwing saltbush, and 2 percent Rock outcrop.

Permeability of the Nepalto soil is rapid. Available water capacity is about 2 to 3 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas. A few areas are also used for homesite development.

The potential natural plant community on this unit is 30 percent grasses, 15 percent forbs, and 55 percent shrubs. Important plants are blackbrush, galleta, shadscale, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and stones in the surface layer.

If this unit is used for homesite development, the main limitation is the content of large stones. Large stones need to be removed for construction of buildings and roads. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Desert Stony Loam (Blackbrush) range site.

63—Newsrock loamy fine sand, 1 to 3 percent slopes. This very deep, somewhat excessively drained soil is on structural benches on Hatch Point and Behind-the-Rocks. It formed in sandy eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long and are undulating. The present vegetation in most areas is mainly blackbrush, Mormon tea, spiny hopsage, and Indian ricegrass. Elevation is 5,200 to 5,600 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 50 to 52 degrees F, and the average freeze-free period is 130 to 150 days.

Typically, the surface layer is yellowish red loamy fine sand 4 inches thick. The upper 13 inches of the subsoil is reddish brown loamy fine sand, and the lower 14 inches is yellowish red fine sandy loam. The upper

15 inches of the substratum is pink sandy clay loam, and the lower part to a depth of 60 inches or more is pink loamy sand. A layer of clay accumulation is at a depth of 4 inches. A layer of carbonate accumulation is at a depth of 31 inches.

Included in this unit are 15 percent Begay fine sandy loam, 10 percent Mido loamy fine sand, dry, on sand shadows and sand drifts under fourwing saltbush, and small areas of moderately deep sandy loam.

Permeability of this Newsrock soil is moderately rapid. Available water capacity is about 6 to 7 inches. Water supplying capacity is 5.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is 55 percent grasses, 15 percent forbs, and 30 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the range vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitations are the low annual precipitation and the loamy fine sand texture of the surface layer. Plants suitable for seeding include adapted native plants.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Semidesert Sandy Loam (Blackbrush) range site.

64—Redbank fine sandy loam, 0 to 3 percent slopes. This very deep, well drained soil is on alluvial bottoms in Fisher Valley and the Dolores Triangle. It formed in alluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly Wyoming big sagebrush, rubber rabbitbrush, and bottlebrush squirreltail. Elevation is 5,600 to 6,200 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is yellowish red fine sandy loam 2 inches thick. The underlying material to a depth of 60 inches or more is yellowish red fine sandy loam stratified with thin lenses of coarse sand and fine sand.

Included in this unit are 15 percent Redbank fine sandy loam on steeper toe slopes and 10 percent Barx fine sandy loam on terrace remnants.

Permeability of the Redbank soil is moderately rapid. Available water capacity is about 7 to 10 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used mainly as rangeland, wildlife habitat, and recreation areas. Small areas are used as irrigated cropland.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

Principal crops grown under irrigation are alfalfa, small grain, and pasture. Average yields per acre per year that can be expected under a high level of management are 4 to 5 tons of alfalfa, 60 to 70 bushels of barley or oats, and 4 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. The main limitations for growing crops are the hazards of soil blowing and erosion. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

This map unit is in capability subclasses IIe, irrigated,

and VIe, nonirrigated. It is in the Upland Loam range site.

65—Redbank fine sandy loam, 3 to 8 percent slopes. This very deep, well drained soil is on alluvial bottoms in Fisher Valley and the Dolores Triangle. It formed in alluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly Wyoming big sagebrush, rubber rabbitbrush, and bottlebrush squirreltail. Elevation is 5,600 to 6,200 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is yellowish red fine sandy loam 2 inches thick. The underlying material to a depth of 60 inches or more is yellowish red fine sandy loam stratified with lenses of coarse sand and fine sand.

Included in this unit are 10 percent Redbank fine sandy loam in less sloping narrow drainage bottoms and 10 percent Barx fine sandy loam on terrace remnants.

Permeability of the Redbank soil is moderately rapid. Available water capacity is about 7 to 10 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation in areas where the desirable forage plants are mostly depleted.

Suitability for rangeland seeding is fair. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIe, nonirrigated. It is in the Upland Loam range site.

66—Redbank fine sandy loam, dry, 0 to 3 percent slopes. This very deep, well drained soil is on valley bottoms in Dry Valley and on Hatch Point (fig. 4). It formed in alluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly Russian thistle, galleta, pricklypear, and rubber rabbitbrush. Elevation is 5,600 to 6,100 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 48 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is reddish brown fine sandy loam 4 inches thick. The underlying material to a depth of 60 inches or more is stratified, yellowish red very fine sandy loam and loam with thin lenses of sandy clay loam, coarse sand, and fine sand.

Included in this unit are 10 percent Redbank very fine sandy loam on flood plains and 10 percent Barnum silty clay loam on flood plains. These soils are under black greasewood.

Permeability of the Redbank soil is moderately rapid. Available water capacity is about 7 to 10 inches. Water supplying capacity is 5 to 6 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, irrigated cropland, and wildlife habitat.

The potential natural plant community on this unit is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

Principal crops grown under irrigation are alfalfa, small grain, and pasture. Average yields per acre per year that can be expected under a high level of management are 5 to 6 tons of alfalfa, 80 bushels of barley or oats, and 5 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small

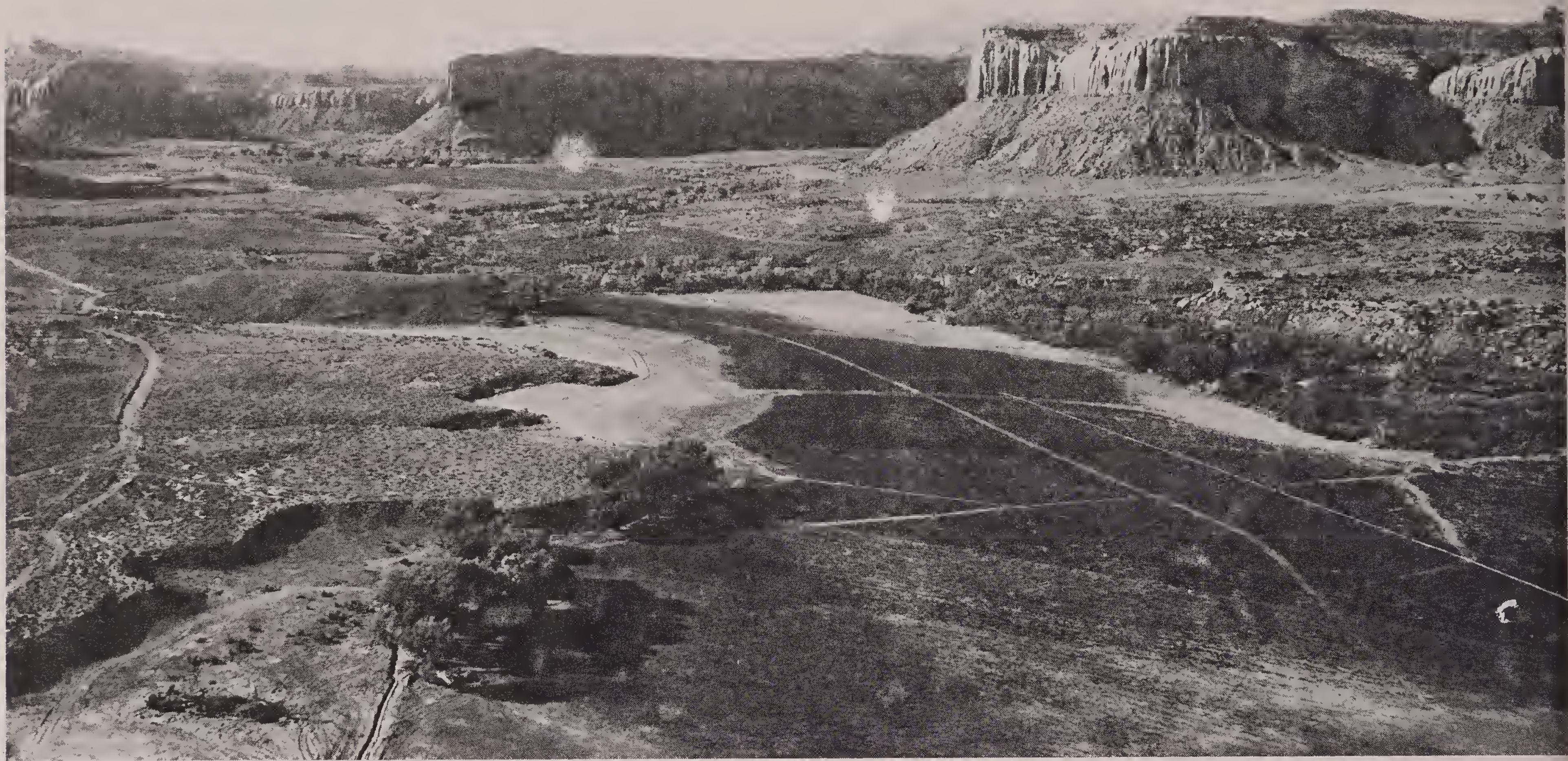


Figure 4.—Area of Redbank fine sandy loam, dry, 0 to 3 percent slopes, on the valley floor.

grain. The main limitation for growing crops is the hazard of soil blowing. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

This map unit is in capability subclasses IIe, irrigated, and VIIe, nonirrigated. It is in the Semidesert Sandy Loam range site.

67—Redbank fine sandy loam, dry, 3 to 8 percent slopes. This very deep, well drained soil is on fan skirts and valley bottoms along Indian and Cottonwood Creeks, below Harts Point. It formed in alluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly fourwing saltbush, galleta, and Mormon tea. Elevation is 5,000 to 5,700 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 48 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is reddish brown fine sandy loam 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish red very fine sandy loam and loam stratified with thin lenses of sandy clay loam, coarse sand, and fine sand.

Included in this unit are 15 percent Redbank fine sandy loam, dry, in the less sloping areas on drainage bottoms and on fan toe slopes, 10 percent Begay fine sandy loam on sand shadows, and 5 percent Mivida fine sandy loam on remnant mesas.

Permeability of the Redbank soil is moderately rapid. Available water capacity is about 7 to 10 inches. Water supplying capacity is 5 to 6 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, irrigated cropland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

Principal crops grown under irrigation are alfalfa, small grain, and pasture. Average yields per acre per year that can be expected under a high level of management are 5 to 6 tons of alfalfa, 80 bushels of barley or oats, and 5 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. The main limitations for growing crops are the hazards of soil blowing and erosion. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

This map unit is in capability subclasses IIIe, irrigated, and VIIe, nonirrigated. It is in the Semidesert Sandy Loam range site.

68—Redbank very fine sandy loam, 0 to 3 percent slopes. This very deep, well drained soil is on valley bottoms in Dry Valley. It formed in alluvium derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly greasewood, Russian thistle, and basin big sagebrush. Elevation is 5,700 to 5,900 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 48 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is yellowish red very fine sandy loam 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish red and reddish yellow fine sandy loam and loamy fine sand stratified with thin lenses of loam, sandy clay loam, and fine sand.

Included in this unit are 10 percent Barnum silty clay loam in adjacent valley bottoms and 10 percent Redbank fine sandy loam, dry, on adjacent terraces under fourwing saltbrush.

Permeability of the Redbank soil is moderately rapid. Available water capacity is about 4.0 to 7.5 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to very brief periods of flooding in July to September. It is moderately sodic.

This unit is used as rangeland, irrigated cropland, and wildlife habitat.

The potential natural plant community on this unit is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Important plants are alkali sacaton, galleta, seepweed, black greasewood, and alkali sacaton.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitations are the low annual precipitation and sodicity of the soil.

Principal crops grown under irrigation are alfalfa, small grain, and pasture. Average yields per acre per year that can be expected under a high level of management are 5 tons of alfalfa, 70 bushels of barley or oats, and 4.5 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. The main limitations for growing crops are the hazard of soil blowing and the sodicity of the soil. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To reduce the sodicity of the soil and maintain soil productivity, applications of irrigation water should be adjusted to leach excess sodium from the root zone. Maintaining crop residue on or near the surface reduces runoff, reduces soil blowing, and helps to maintain soil tilth and organic matter content.

This map unit is in capability subclasses IIIs, irrigated, and VIIs, nonirrigated. It is in the Alkali Flat range site.

69—Richens-Herd complex, 3 to 15 percent slopes. This map unit is on remnant ground moraines on Bald Mesa and Boren Mesa, in the La Sal Mountains. Elevation is 8,600 to 10,400 feet. The average annual precipitation is 25 to 30 inches, the mean annual air temperature is 35 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

This unit is 40 percent Richens silt loam, 3 to 15 percent slopes; 35 percent Herd very stony loam, 3 to 15 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 15 percent Sirref loam on outwash fans under mountain big sagebrush and Toone loam on outwash fans under oak; 6 percent Flygare loam on lateral moraines under quaking aspen; and 4 percent Broad Canyon very stony loam on mountainsides under Thurber fescue.

The Richens soil is very deep and well drained. It formed in glacial till derived dominantly from mixed sedimentary and igneous rock. Slopes are 50 to 100 feet long, are concave to convex, and dominantly face west. The present vegetation in most areas is mainly mountain iris, low sagebrush, Indian paintbrush, and Sandberg bluegrass. Typically, the surface layer is dark brown silt loam 7 inches thick. The subsurface layer is dark brown gravelly silty clay loam 12 inches thick. The upper 19 inches of the subsoil is light reddish brown clay, and the lower part to a depth of 60 inches or more is light reddish brown gravelly clay. A layer of clay accumulation is at a depth of 19 inches.

Permeability of the Richens soil is very slow. Available water capacity is 8 to 10 inches. Water supplying capacity is 16 to 21 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Herd soil is very deep and well drained. It formed in glacial till derived dominantly from mixed sedimentary and igneous rock overlying shale. Slopes are less than 100 feet long, are concave to convex, and dominantly face west. The present vegetation in most areas is mainly low sagebrush, mountain aster, Indian paintbrush, and bluebunch wheatgrass. Typically, 5 percent of the surface is covered with stones, 15 percent with cobbles, and 25 percent with pebbles. The surface layer is reddish brown very stony loam 4 inches thick. The upper 17 inches of the subsoil is reddish brown stony clay loam, and the lower 9 inches is light yellowish brown clay. The substratum to a depth of 60 inches or more is very pale brown clay. A layer of clay accumulation is at a depth of 9 inches.

Permeability of this Herd soil is moderately slow. Available water capacity is about 8 to 10 inches. Water supplying capacity is 16 to 21 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Richens soil is 65 percent grasses, 20 percent forbs, and 15 percent shrubs. Important plants are Columbia needlegrass, mountain brome, slender wheatgrass, and mountain big sagebrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is fair. Plants suitable for seeding include adapted native plants, slender wheatgrass, smooth brome, regar brome, alfalfa, and bitterbrush.

The potential natural plant community on the Herd soil is 60 percent grasses, 25 percent forbs, and 15 percent shrubs. Important plants are Thurber fescue, mountain brome, slender wheatgrass, aspen peavine, and mountain big sagebrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the stones in the surface layer. Plants suitable for seeding include adapted native plants, smooth brome, regar brome, alfalfa, and bitterbrush.

This map unit is in capability subclass VIe, nonirrigated. The Richens soil is in the High Mountain Clay range site, and the Herd soil is in the High Mountain Loam (Thurber Fescue) range site.

70—Rizno-Rock outcrop complex, 3 to 15 percent slopes. This map unit is on structural benches, cuestas, and mesas throughout the survey area. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly pinyon, Utah juniper, big sagebrush, and antelope bitterbrush. Elevation is 6,000 to 7,200 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 130 days.

This unit is 45 percent Rizno fine sandy loam, 3 to 15 percent slopes; 30 percent Rock outcrop; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 5 percent Mido loamy fine sand in sand drifts under grasses, 5 percent Sazi very fine sandy loam on remnant mesas under fourwing saltbush, 5 percent Bond fine sandy loam on eolian sheets, 5 percent Ignacio fine sandy loam on remnant mesas under Wyoming big sagebrush, and 5 percent Leanto fine sandy loam on remnant mesas under black sagebrush. Also included are small areas of soils that have slopes of more than 15 percent.

The Rizno soil is shallow and well drained. It formed in eolian deposits and slopewash over residuum derived dominantly from sandstone and shale. Typically, the surface layer is light reddish brown fine sandy loam 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 2 to 4 inches. The organic matter content of the surface layer is 1 to 3 percent. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Rizno soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Indian ricegrass, Bigelow sagebrush, and Mormon tea.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow depth to bedrock and very low available water capacity. Plants suitable for seeding are native plants, crested wheatgrass, pubescent wheatgrass, alfalfa, yellow sweetclover, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Rizno soil is in woodland suitability group 3d and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site. The Rock outcrop is not assigned to a range site.

71—Rizno, dry-Rock outcrop complex, 3 to 15 percent slopes. This map unit is on structural benches, cuestas, and mesas throughout the survey area. Elevation is 4,800 to 6,000 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 53 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 45 percent Rizno gravelly fine sandy loam, dry, 3 to 15 percent slopes; 25 percent Rock outcrop; and 30 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Arches fine sand on structural benches under blackbrush, 5 percent Mido loamy fine sand, dry, on sand drifts under fourwing saltbush, 5 percent Sazi very fine sandy loam on mesas under grasses, 5 percent Begay fine sandy loam on structural benches under fourwing saltbush, and 5 percent Ignacio fine sandy loam, dry, on mesas under fourwing saltbush. Also included are small areas of deep, loamy soils that are 18 to 24 percent clay.

The Rizno soil is shallow and well drained. It formed in eolian deposits over residuum derived dominantly from sandstone and shale. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly blackbrush, galleta, Mormon tea, and Utah juniper. Typically, the surface layer is light reddish brown gravelly fine sandy loam 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 4 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Rizno soil is an overstory of Utah juniper and pinyon with a canopy of 15 percent. The understory vegetation is 20 percent grasses, 15 percent forbs, and 65 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, and Mormon tea.

The site index for Utah juniper and pinyon is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow depth to bedrock, very low available water capacity, and low annual precipitation. Plants suitable for seeding are native plants and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Rizno soil is in woodland suitability group 3d and in the Semidesert Shallow Sandy Loam (Utah Juniper-Pinyon) woodland site. The Rock outcrop is not assigned to a range site.

72—Rock outcrop. This map unit consists of areas that are 90 percent or more barren rock. It occurs as escarpments along mesas and benches, canyon walls, isolated monoliths, and slickrock throughout much of the survey area.

Rock outcrop supports little or no vegetation. The sparse native vegetation, where present, is mainly Utah juniper, pinyon, antelope bitterbrush, and birchleaf mountainmahogany.

Included in this unit are small areas of Rubble land, Badland, and shallow soils.

This map unit is in capability subclass VIII. It is not assigned to a range site.

73—Rock outcrop-Moenkopie complex, 3 to 15 percent slopes. This map unit is on benches and cuestas west of Hurrah Pass, Kane Springs Canyon, and Lockhart Basin and adjacent to the Colorado River. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 53 to 55 degrees F, and the average freeze-free period is 150 to 170 days.

This unit is 60 percent Rock outcrop; 25 percent Moenkopie gravelly loamy sand, 3 to 15 percent slopes; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 5 percent Trail fine sand and 5 percent Thoroughfare fine sandy loam on fluves under fourwing saltbush, 5 percent Sheppard fine sand on sand shadows under grasses, and small areas of Arches fine sand on sand sheets under blackbrush.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

The Moenkopie soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. The present vegetation in most areas is mainly blackbrush, green Mormon tea, shadscale, and galleta. Slopes are 50 to 100 feet long. Typically, the surface layer is reddish brown gravelly loamy sand 3 inches thick. The underlying material to a depth of 8 inches is reddish brown sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 3 to 20 inches.

Permeability of the Moenkopie soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is less than 2 inches. Effective rooting depth is 3 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on the Moenkopie soil is 25 percent grasses, 5 percent forbs, and 70 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, shadscale, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow soil depth, low annual precipitation, and very low available water capacity.

This map unit is in capability subclass VIIs, nonirrigated. The Rock outcrop is not assigned to a range site. The Moenkopie soil is in the Desert Shallow Sandy Loam (Blackbrush) range site.

74—Rock outcrop-Rizno complex, 3 to 15 percent slopes. This map unit is on the rim of benches and cuesta escarpments and on the dip slopes of hogbacks throughout the survey area. Elevation is 6,000 to 7,200 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 130 days.

This unit is 70 percent Rock outcrop; 20 percent Rizno fine sandy loam, 3 to 15 percent slopes; and 10 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map

them separately at the scale used.

Included in this unit are small areas of Mido loamy fine sand on sand drifts under grasses, Ignacio fine sandy loam on benches and cuestas under Wyoming big sagebrush, Leanto fine sandy loam on benches and cuestas under black sagebrush, and Begay fine sandy loam, moist, in shallow depressional areas and on sand shadows under Wyoming big sagebrush.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

The Rizno soil is shallow and well drained. It formed in eolian deposits over residuum derived dominantly from sandstone and shale. Slopes are convex to concave and are less than 100 feet long. The present vegetation in most areas is mainly pinyon, Utah juniper, big sagebrush, and antelope bitterbrush. Typically, the surface layer is light reddish brown fine sandy loam 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderate. Available water capacity is less than 2 inches. Water supplying capacity is 2 to 4 inches. The organic matter content of the surface layer is 1 to 3 percent. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Rizno soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Indian ricegrass, Bigelow sagebrush, and Mormon tea.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow depth to bedrock and very low available water capacity. Plants suitable for seeding are native plants, crested wheatgrass, pubescent wheatgrass, alfalfa, yellow sweetclover, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Rock outcrop is not assigned to a range or woodland site. The Rizno soil is in woodland suitability group 3d and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site.

75—Rock outcrop-Rizno, dry complex, 3 to 15 percent slopes. This map unit is on structural bench rims, cuesta escarpments, and hogback dip slopes throughout the survey area. Elevation is 4,800 to 6,000 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 53 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 65 percent Rock outcrop; 20 percent Rizno gravelly fine sandy loam, dry, 3 to 15 percent slopes; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Arches fine sand on sand sheets under blackbrush and 5 percent Mido loamy fine sand on sand drifts under grasses.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

The Rizno soil is shallow and well drained. It formed in eolian deposits over residuum derived dominantly from sandstone and shale. Slopes are 50 to 100 feet long. The present vegetation in most areas is mainly blackbrush, galleta, Mormon tea, and Utah juniper. Typically, the surface layer is light reddish brown gravelly fine sandy loam 2 inches thick. The underlying material to a depth of 8 inches is reddish brown and pinkish gray fine sandy loam. Sandstone is at a depth of 8 inches. Depth to bedrock ranges from 4 to 20 inches.

Permeability of the Rizno soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 4 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Rizno soil is an overstory of Utah juniper and pinyon with a canopy of 15 percent. The understory vegetation is 20 percent grasses, 15 percent forbs, and 65 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, and Mormon tea.

The site index for Utah juniper and pinyon is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the

rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow depth to bedrock, very low available water capacity, and low annual precipitation. Plants suitable for seeding are native plants and prostrate kochia.

This map unit is in capability subclass VIII, nonirrigated. The Rock outcrop is not assigned to a range or woodland site. The Rizno soil is in woodland suitability group 3d and in the Semidesert Shallow Sandy Loam (Utah Juniper-Pinyon) woodland site.

76—Rock outcrop-Ustic Torripsamments complex, 2 to 15 percent slopes. This map unit is on structural benches and cuestas in the vicinity of Pritchett Canyon, Mill Creek Canyon, and Hunters Canyon. Elevation is 4,700 to 5,500 feet. The average annual precipitation is 9 to 11 inches, the mean annual air temperature is 50 to 52 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 45 percent Rock outcrop; 30 percent Ustic Torripsamments, 2 to 15 percent slopes, adjacent to and between areas of Rock outcrop; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Rizno gravelly fine sandy loam, between fins, on escarpments, and on ledges under juniper and pinyon; 10 percent Arches fine sand on sand sheets under blackbrush; and 5 percent Ignacio fine sandy loam, dry, in slightly depressional areas under fourwing saltbush.

Rock outcrop is exposures of sandstone in the form of ledges, fins, monoliths, and slickrock.

The Ustic Torripsamments are moderately deep to very deep and are well drained. They formed in eolian sand derived dominantly from sandstone. Slopes are 50 to 100 feet long. The present vegetation in most areas is mainly Indian ricegrass, Mormon tea, yucca, and sand dropseed. No single profile of Ustic Torripsamments is typical, but one commonly observed in the survey area has a surface layer of reddish yellow fine sand 3 inches thick. The upper 11 inches of the underlying material is yellowish red fine sand, and the lower part to a depth of 34 inches is yellowish red loamy fine sand. Sandstone is at a depth of 34 inches. Depth to bedrock ranges from 20 to 60 inches or more. Rock fragment content, texture, and other soil properties vary significantly within short distances.

Permeability of the Ustic Torripsamments is rapid. Available water capacity is 2 to 3 inches. Water supplying capacity is 2.5 to 3.5 inches. Effective rooting depth is 20 to 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat. A few areas are used for homesite development.

The potential plant community on the Ustic Torripsamments is 50 percent grasses, 15 percent forbs, and 35 percent shrubs. Important plants are Indian ricegrass, Mormon tea, dropseed, fourwing saltbush, and sandhill muhly.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the hazard of soil blowing, low annual precipitation, and the sandy texture of the surface layer. Plants suitable for seeding include fourwing saltbush, Indian ricegrass, sand dropseed, and other native plants.

This map unit is in capability subclass VIIe, nonirrigated. The Rock outcrop is not assigned to a range site. The Ustic Torripsamments are in the Semidesert Sand range site.

77—Rubble land. This map unit consists of areas in the La Sal Mountains that are covered with stones and boulders so that almost no soil material is exposed. Rubble land supports very little vegetation except for the more stable areas on talus slopes that have a partial cover of low shrubs and grasses and a few stunted trees.

Included in this unit are 10 percent Rock outcrop and small areas of Meredith stony loam and Leighcan cobbly loam.

This map unit is in capability subclass VIII. It is not assigned to a range site.

78—Sedillo very stony fine sandy loam, 3 to 15 percent slopes. This very deep, well drained soil is on alluvial fans at the south end of Fisher Valley. It formed in mixed alluvium derived dominantly from sandstone and intrusive igneous rock. Slopes are 100 to 300 feet long and face north. The present vegetation in most areas is mainly Wyoming big sagebrush, muttongrass, pinyon, and Utah juniper. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 14

inches, the mean annual air temperature is 46 to 48 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is dark reddish gray very stony fine sandy loam 7 inches thick. The subsoil is reddish brown very cobbly clay loam 5 inches thick. The upper 33 inches of the substratum is pinkish white very cobbly sandy loam, and the lower part to a depth of 60 inches or more is light reddish brown very cobbly fine sandy loam.

Included in this unit are 15 percent Barx fine sandy loam on benches and cuestas under Wyoming big sagebrush and 10 percent Sedillo soils that have slopes of more than 15 percent.

Permeability of the Sedillo soil is moderately slow. Available water capacity is about 4 to 6 inches. Water supplying capacity is 4.5 to 7.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Sedillo soil is 55 percent grasses, 10 percent forbs, and 35 percent shrubs. Important plants are muttongrass, Nevada bluegrass, Wyoming big sagebrush, and prairie junegrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management can be used to improve the rangeland vegetation. Suitable brush management practices include chemical spraying and prescribed burning.

Suitability for rangeland seeding is very poor. The main limitation is the rock fragments on the surface. Broadcast seeding followed by dragging of the surface to cover the seed is suited to this unit.

This map unit is in capability subclass VIIs, nonirrigated. It is in the Upland Stony Loam range site.

79—Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes. This map unit is on dissected cuesta summits in the area of La Sal Junction, Big Indian Valley, and Coyote Wash. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 110 to 130 days.

This unit is 40 percent Shalako gravelly fine sandy loam, 3 to 15 percent slopes, on cuesta floors; 25 percent Anasazi gravelly loam, 3 to 15 percent slopes, on erosional remnants; 15 percent Rock outcrop on rims and ledges; and 20 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 5 percent Rizno fine sandy loam on cuesta rims under pinyon and juniper; 5 percent very deep, loamy soils on escarpments; 5 percent Bond fine sandy loam under pinyon and juniper and Leanto fine sandy loam on cuesta dip slopes under black sagebrush; and 5 percent Windwhistle very fine sandy loam in shallow depressional areas under Wyoming big sagebrush.

The Shalako soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Slopes are 50 to 100 feet long and are convex. The present vegetation in most areas is mainly pinyon, Utah juniper, antelope bitterbrush, and big sagebrush. Typically, the surface layer is reddish brown gravelly fine sandy loam 2 inches thick. The subsoil is yellowish brown gravelly sandy loam 4 inches thick. The substratum is pale brown gravelly sandy loam 7 inches thick. Sandstone is at a depth of 13 inches. Depth to bedrock ranges from 10 to 20 inches. A layer of carbonate accumulation is at a depth of 9 to 13 inches.

Permeability of the Shalako soil is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 2 to 3 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Anasazi soil is moderately deep and well drained. It formed in eolian deposits mixed with residuum derived dominantly from sandstone. Slopes are 50 to 100 feet long and are concave. The present vegetation in most areas is mainly big sagebrush, blue grama, Indian ricegrass, and antelope bitterbrush. Typically, the surface layer is brown gravelly loam 9 inches thick. The subsoil is light brown gravelly loam 5 inches thick. The upper 7 inches of the substratum is light brown gravelly loam, and the lower part to a depth of 26 inches is pinkish white gravelly fine sandy loam. Sandstone is at a depth of 26 inches. Depth to bedrock ranges from 20 to 40 inches. A layer of carbonate accumulation is at a depth of more than 9 inches.

Permeability of the Anasazi soil is moderately rapid. Available water capacity is about 2.0 to 3.5 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is

medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as wildlife habitat, woodland, and recreation areas.

The potential natural plant community on the Shalako soil is an overstory of pinyon and Utah juniper with a canopy of 15 percent. The understory vegetation is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Indian ricegrass, Bigelow sagebrush, and Mormon tea.

The site index for pinyon and Utah juniper is 40. Average yields are 4.5 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the shallow depth to bedrock and very low available water capacity. Plants suitable for seeding are native plants, crested wheatgrass, pubescent wheatgrass, alfalfa, yellow sweetclover, and prostrate kochia.

The potential natural plant community on the Anasazi soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is fair. The main limitations are the moderate depth to bedrock, low available water capacity, and low annual precipitation. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated. The Shalako soil is in woodland suitability group 3d and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site. The Anasazi soil is in the Upland Loam range site. The Rock outcrop is not assigned to a range or woodland site.

80—Sheppard fine sand, 2 to 8 percent slopes. This very deep, somewhat excessively drained soil is on sand sheets and sand shadows on structural benches and cuestas in the Indian Creek and Salt Creek areas. It formed in eolian deposits derived dominantly from sandstone. Slopes are convex and are 100 to 300 feet long. The present vegetation in most areas is mainly Indian ricegrass, sand dropseed, Mormon tea, and stickseed. Elevation is 4,600 to 5,000 feet. The average annual precipitation is 6 to 8 inches, the mean annual air temperature is 52 to 54 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is red fine sand about 3 inches thick. The upper 27 inches of the underlying material is red fine sand, the next 12 inches is reddish yellow loamy fine sand, and the lower part to a depth of 60 inches or more is reddish yellow loamy sand.

Included in this unit are 10 percent Arches fine sand on cuesta floors under blackbrush, 10 percent Trail fine sand on fluves under fourwing saltbush, and 10 percent Nakai fine sand on stable eolian sheets and in depressional areas under fourwing saltbush.

Permeability of this Sheppard soil is rapid. Available water capacity is about 4 to 5 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 0.5 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as rangeland, wildlife habitat, irrigated cropland, urban development, and recreation areas.

The potential natural plant community on this unit is 55 percent grasses, 20 percent forbs, and 25 percent shrubs. Important plants are Indian ricegrass, sand dropseed, sand sagebrush, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and the high hazard of soil blowing. Plants suitable for seeding are fourwing saltbush, Indian ricegrass, spike dropseed, and prostrate kochia.

Principal crops grown under irrigation are alfalfa, corn, small grain, peaches, pears, apples, and melons. Average yields per acre per year that can be expected under a high level of management are 8 tons of alfalfa, 100 bushels of corn, 20 tons of corn silage, 100 bushels

of oats or barley, 450 bushels of peaches, pears, or apples, 10 tons of cantaloup, and 15 tons of watermelon. The main limitations for growing crops are the hazards of soil blowing and water erosion, rapid permeability, and low available water capacity. Because the permeability is rapid, sprinkler or drip irrigation is best suited to this unit. If furrow irrigation is used, water should be applied at frequent intervals and runs should be short. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

If this unit is used for urban development, the main limitations are the hazard of soil blowing and the rapid permeability. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems. Cutbanks are not stable and are subject to slumping.

This map unit is in capability subclasses IIIe, irrigated, and VIIe, nonirrigated. It is in the Desert Sand range site.

81—Sirref loam, 4 to 8 percent slopes. This very deep, well drained soil is on outwash fans in the La Sal Mountains. It formed in alluvium derived dominantly from diorite. Slopes are 50 to 100 feet long and are convex to concave. The present vegetation in most areas is mainly mountain big sagebrush, Utah serviceberry, bluegrass, and antelope bitterbrush. Elevation is 8,200 to 8,500 feet. The average annual precipitation is 18 to 22 inches, the mean annual air temperature is 42 to 44 degrees F, and the average freeze-free period is 70 to 90 days.

Typically, the surface layer is reddish brown loam 3 inches thick. The upper 12 inches of the subsoil is reddish brown gravelly clay loam and gravelly clay, and the lower 33 inches is yellowish red very gravelly clay and very cobbly clay. The substratum to a depth of 60 inches or more is pink very cobbly clay loam. Depth to a layer of clay accumulation is 3 inches, and depth to a layer of carbonate accumulation is 33 inches.

Included in this unit are 10 percent Toone loam on north-facing side slopes under oak, 10 percent Fughes loam in shallow depressional areas under mountain big sagebrush, and 5 percent Sirref soils on south-facing side slopes of more than 8 percent.

Permeability of the Sirref soil is slow. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 9 to 15 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are muttongrass, needleandthread, blue grama, mountain big sagebrush, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning and chemical spraying. Suitability for rangeland seeding is good.

This map unit is in capability subclass IVe, nonirrigated. It is in the Mountain Stony Loam range site.

82—Sirref-Toone loams, 4 to 10 percent slopes. This map unit is on outwash fans in the La Sal Mountains. Slopes are 50 to 100 feet long and are convex to concave. Elevation is 8,400 to 9,000 feet. The average annual precipitation is 20 to 25 inches, the mean annual air temperature is 41 to 44 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 50 percent Sirref loam, 4 to 8 percent slopes, on south-facing side slopes and interfluves and 40 percent Toone loam, 4 to 10 percent slopes, on north-facing side slopes and interfluves. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 5 percent Sirref soils that have slopes of more than 10 percent and 5 percent Herm clay loam on solifluction lobes under oak.

The Sirref soil is very deep and well drained. It formed in alluvium derived dominantly from diorite. The present vegetation in most areas is mainly big sagebrush, snowberry, lupine, and western wheatgrass. Typically, the surface layer is reddish brown loam 3

inches thick. The upper 12 inches of the subsoil is reddish brown gravelly clay loam and gravelly clay, and the lower 33 inches is yellowish red very gravelly clay and very cobbly clay. The substratum to a depth of 60 inches or more is pink very cobbly clay loam. Depth to a layer of clay accumulation is 3 inches, and depth to a layer of carbonate accumulation is 33 inches.

Permeability of the Sirref soil is slow. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 10 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Toone soil is very deep and well drained. It formed in alluvium derived dominantly from diorite. The present vegetation in most areas is mainly Gambel oak, snowberry, and mountain brome. Typically, the surface is covered with a mat of partially decayed leaves 1 inch thick. The surface layer is very dark gray loam and dark reddish brown silt loam 25 inches thick. The upper 8 inches of the subsoil is brown gravelly clay loam, and the lower 27 inches is reddish brown very gravelly clay and very stony clay.

Permeability of the Toone soil is slow. Available water capacity is about 6 to 9 inches. Water supplying capacity is 11 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Sirref soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are muttongrass, needleandthread, blue grama, mountain big sagebrush, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning and chemical spraying.

Suitability for rangeland seeding is good. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, and alfalfa.

The potential natural plant community on the Toone soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and Utah serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is good. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

This map unit is in capability subclass IVe, nonirrigated. The Sirref soil is in the Mountain Stony Loam range site, and the Toone soil is in the Mountain Loam (Oak) range site.

83—Skylick loam, 5 to 30 percent slopes. This very deep, well drained soil is in landslide areas and on mountainsides in the La Sal Mountains. It formed in landslide deposits, slopewash, and outwash derived dominantly from diorite and mixed sedimentary rock. Slopes are convex to concave and are 100 to 300 feet long. The present vegetation in most areas is mainly quaking aspen, snowberry, aspen peavine, and bluegrass. Elevation is 8,500 to 9,500 feet. The average annual precipitation is 25 to 30 inches, the mean annual air temperature is 37 to 40 degrees F, and the average freeze-free period is 30 to 50 days.

Typically, the surface layer is dark gray loam about 37 inches thick. The subsoil to a depth of 60 inches or more is reddish brown cobbly clay loam.

Included in this unit are about 15 percent Flygare loam on outwash fans under quaking aspen and 15 percent Toone loam on outwash fans under oak.

Permeability of this Skylick soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 16 to 21 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 8 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as wildlife habitat, rangeland, woodland, and recreation areas.

The potential natural plant community on this unit is an overstory of aspen with a canopy of 60 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

Suitability for the production of aspen is fair. The site index for aspen ranges from 60 to 80. The risk of

erosion is moderate in the steeper areas that have been exposed by timber harvesting operations. Equipment use is moderately restricted in areas that have slopes of more than 15 percent.

The suitability for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIe, nonirrigated. It is in woodland suitability group 3o and in the High Mountain Loam (Aspen) woodland site.

84—**Slickens.** This map unit consists of accumulations of fine-textured material from ore mill operations and is in areas where the overburden and waste have been discarded. These areas are near milling operations in Lisbon Valley. The areas locally are called tailing ponds.

This map unit is in capability subclass VIII. It is not assigned to a range site.

85—**Strych very cobbly fine sandy loam, 8 to 30 percent slopes.** This very deep, well drained soil is on alluvial fans and in areas of valley fill on the south-facing foot slopes of the La Sal Mountains. It formed in alluvium derived dominantly from sandstone, shale, and intrusive igneous rock. Slopes are concave, south- and west-facing, and 100 to 300 feet long. The present vegetation in most areas is mainly galleta, pinyon, Utah juniper, and Mormon tea. Elevation is 6,300 to 6,600 feet. The average annual precipitation is 13 to 16 inches, the mean annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown very cobbly fine sandy loam about 3 inches thick. The subsoil is brown cobbly fine sandy loam about 7 inches thick. The upper 15 inches of the substratum is light brown and pinkish gray very gravelly fine sandy loam, and the lower part to a depth of 60 inches or more is pink very gravelly fine sandy loam and extremely gravelly loamy sand.

Included in this unit are 10 percent Bluehon stony loam on relict fans under pinyon and juniper and 5 percent Sedillo very stony fine sandy loam on fan back slopes under Wyoming big sagebrush.

Permeability of the Strych soil is moderately rapid. Available water capacity is about 3 to 4 inches. Water supplying capacity is 4.0 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is severe. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and woodland.

The potential natural plant community on this unit is an overstory of pinyon and Utah juniper with a canopy of 20 percent. The understory vegetation is 40 percent grasses, 5 percent forbs, and 55 percent shrubs. Important plants are rock goldenrod, muttongrass, Nevada bluegrass, prairie junegrass, pinyon, and green Mormon tea.

The site index for pinyon and Utah juniper is 75. Average yields are 9 cords of wood per acre per year. The potential is fair for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitations are the rock fragments on the surface and the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 2x and in the Upland Stony Loam (Pinyon-Utah Juniper) woodland site.

86—**Strych very cobbly fine sandy loam, 30 to 60 percent slopes.** This very deep, well drained soil is on alluvial fans and talus cones in Castle Valley. It formed in alluvium derived dominantly from diorite. Slopes are convex to concave and are 100 to 300 feet long. The present vegetation in most areas is mainly galleta, pinyon, Utah juniper, and Mormon tea. Elevation is 6,500 to 7,100 feet. The average annual precipitation is 14 to 16 inches, the mean annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is brown very cobbly fine sandy loam about 3 inches thick. The subsoil is brown cobbly fine sandy loam about 7 inches thick. The upper 15 inches of the substratum is light brown and pinkish gray very gravelly fine sandy loam, and the lower part to a depth of 60 inches or more is pink very gravelly fine sandy loam and extremely gravelly loamy sand.

Included in this unit are about 10 percent Rizno fine sandy loam on remnant mesas under pinyon and juniper, 10 percent Sedillo very stony fine sandy loam on alluvial fans under Wyoming big sagebrush, and 10 percent Moab very cobbly fine sandy loam on alluvial fans under blackbrush.

Permeability of the Strych soil is moderately rapid. Available water capacity is about 3 to 4 inches. Water supplying capacity is 5 to 6 inches. Effective rooting

depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is severe. Soil blowing is not a hazard.

This unit is used as rangeland, wildlife habitat, and woodland.

The potential vegetation on this unit is an overstory of pinyon and Utah juniper with a canopy of 20 percent. The understory vegetation is 40 percent grasses, 5 percent forbs, and 55 percent shrubs. Important plants are muttongrass, Nevada bluegrass, Indian ricegrass, and bottlebrush squirreltail.

The site index for pinyon and Utah juniper is 75. Average yields are 9 cords of wood per acre per year. The potential is fair for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the rock fragments on the surface and steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. It is in woodland suitability group 2r and in the Upland Very Steep Stony Loam (Pinyon-Utah Juniper) woodland site.

87—Strych very cobbly fine sandy loam, dry, 8 to 15 percent slopes. This very deep, well drained soil is on alluvial fans in Fisher Valley. It formed in alluvium and colluvium derived dominantly from sandstone, diorite, and shale. Slopes are 100 to 300 feet long, are plane to concave, and face south or southeast. The present vegetation in most areas is mainly pinyon, Utah juniper, Wyoming big sagebrush, galleta, and yucca. Elevation is 5,700 to 6,000 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

Typically, the surface layer is yellowish red very cobbly fine sandy loam 8 inches thick. The upper 19 inches of the underlying material is yellowish red very cobbly fine sandy loam, the next 7 inches is yellowish red fine sandy loam, the next 5 inches is yellowish red very gravelly fine sandy loam, and the lower part to a depth of 60 inches or more is yellowish red very cobbly fine sandy loam.

Included in this unit is 10 percent Ustic Torriorthents on colluvial toe slopes under blackbrush and Redbank fine sandy loam, dry, on alluvial fan skirts under fourwing saltbush.

Permeability of the Strych soil is moderately rapid. Available water capacity is about 4 to 6 inches. Water supplying capacity is 4.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as wildlife habitat, rangeland, woodland, and urban development.

The potential natural plant community on this unit is an overstory of Utah juniper and pinyon with a canopy of 10 to 15 percent. The understory vegetation is approximately 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Important plants are galleta, Indian ricegrass, blue grama, fourwing saltbush, and Mormon tea.

The site index for Utah juniper and pinyon is 35. Average yields are 4 cords of wood per acre per year. The potential is poor for production of posts and Christmas trees.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Burning or chaining can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is poor. The main limitations are the low annual precipitation and the content of rock fragments in the surface layer.

If this unit is used for urban development, the main limitations are the steepness of slope, the hazard of erosion, and the content of rock fragments. Preserving the existing plant cover during construction helps to control erosion. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Structures to divert runoff are needed if buildings and roads are constructed. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 1x and in the Semidesert Gravelly Loam (Utah Juniper-Pinyon) woodland site.

88—Thoroughfare fine sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on alluvial terraces and bottoms in Lockhart Basin, along Indian Creek in the Harts Draw area, and in Professor Valley. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly blue grama, galleta, snakeweed, and fourwing saltbush. Elevation is 4,100 to 5,200 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 54 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is dark red fine sandy loam 2 inches thick. The underlying material to a depth of 60 inches or more is stratified, red fine sandy loam and gravelly loamy sand.

Included in this unit are 10 percent Trail fine sand under fourwing saltbush and 7 percent Bluechief fine sandy loam on interfluves and cuesta remnants.

Permeability of the Thoroughfare soil is moderately rapid. Available water capacity is about 5 to 8 inches. Water supplying capacity is 3.5 to 5.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high. This soil is subject to very brief periods of flooding during July to September.

This unit is used as rangeland, irrigated cropland, and wildlife habitat. A few areas are used for urban development.

The potential natural plant community on this unit is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are galleta, fourwing saltbush, Indian ricegrass, winterfat, and dropseed.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitation is the low annual precipitation. Plants suitable for seeding are adapted native plants and prostrate kochia.

Principal crops grown under irrigation are alfalfa, corn, small grain, peaches, pears, apples, and melons. Average yields per acre per year that can be expected under a high level of management are 8 tons of alfalfa, 100 to 110 bushels of corn, 20 tons of corn silage, 100 bushels of oats or barley, 400 to 500 bushels of peaches, 12 tons of cantaloup, and 16 tons of watermelon. Furrow, corrugation, drip, and sprinkler irrigation systems are suited to the soil in this unit. The method used generally is governed by the crop. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. For the efficient application and removal of irrigation water, leveling is needed in sloping areas. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

If this unit is used for homesite development, the main limitations are the hazards of flooding and soil blowing. Flooding can be controlled only by the use of major flood control structures. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing.

This map unit is in capability subclasses IIIe, irrigated, and VIIe, nonirrigated. It is in the Desert Sandy Loam range site.

89—Thoroughfare loam, 0 to 3 percent slopes. This very deep, well drained soil is on valley bottoms and terraces along the Colorado River and in Professor Valley. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly greasewood, shadscale, seepweed, and rabbitbrush. Elevation is 3,800 to 4,800 feet. The average annual precipitation is 6 to 9 inches, the mean annual air temperature is 52 to 56 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is yellowish red loam about 2 inches thick. The underlying layer to a depth of 60 inches or more is stratified, yellowish red very fine sandy loam, sandy clay loam, and clay loam and reddish brown fine sandy loam, loamy fine sand, and fine sand. This soil is sodium affected.

Included in this unit are 10 percent Thoroughfare fine sandy loam on adjacent terraces under grasses, 5 percent Bluechief fine sandy loam on cuesta remnants under grasses, and small areas of Thoroughfare soils that have very gravelly loamy fine sand below a depth of 40 inches.

Permeability of this Thoroughfare soil is moderate. Available water capacity is about 6.0 to 8.5 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. This soil is subject to very brief periods of flooding in July

through September. It is moderately sodic.

This unit is used as wildlife habitat, recreation areas, and rangeland. A few areas are used as irrigated cropland and urban development.

The potential natural plant community on this unit is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Important plants are bottlebrush squirreltail, alkali sacaton, galleta, seepweed, and black greasewood.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and the sodicity of the soil.

Principal crops grown under irrigation are alfalfa and barley. Average yields per acre per year that can be expected under a high level of management are 7 tons of alfalfa and 80 bushels of barley. The main limitations for growing crops are the hazards of soil blowing and water erosion and the sodicity of the soil. Furrow, corrugation, drip, and sprinkler irrigation systems are suited to this soil. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. For the efficient application and removal of irrigation water, leveling is needed in sloping areas. To reduce the sodicity of the soil and to maintain soil productivity, applications of irrigation water should be adjusted to leach excess sodium from the root zone. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

If this unit is used for urban development, the main limitations are the hazards of flooding and soil blowing. Flooding can be controlled only by use of major flood control structures. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing.

This map unit is in capability subclasses IVs, irrigated, and VIIs, nonirrigated. It is in the Alkali Flat range site.

90—Tolman Variant loam, 3 to 10 percent slopes. This shallow, well drained soil is on cuestas on the eastern flank of the La Sal Mountains. It formed in residuum derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly ponderosa pine, Gambel oak, and snowberry. Elevation is 8,000 to 9,000 feet. The average annual precipitation is 20 to 25 inches, the mean annual air temperature is 40 to 42 degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is brown and reddish brown very cobbly sandy clay loam 7 inches thick. Sandstone is at a depth of 17 inches. Depth to bedrock ranges from 10 to 20 inches.

Included in this unit are 10 percent Dranyon sandy loam on fluves under quaking aspen, 3 percent Toone loam on south-facing slopes under Gambel oak, and 2 percent Rock outcrop.

Permeability of the Tolman Variant soil is moderate. Available water capacity is 1.5 to 2.0 inches. Water supplying capacity is 5 to 9 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as woodland, rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on this unit is an overstory of ponderosa pine with a canopy of 20 percent. The understory vegetation is 30 percent grasses, 10 percent forbs, and 60 percent shrubs. Important plants are greenleaf manzanita, Gambel oak, elk sedge, and serviceberry.

This unit is well suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 60 to 80. The main concerns in producing and harvesting timber are the seedling mortality rate and the susceptibility of the soil to windthrow. The seedling mortality rate is moderate because of the shallow depth to bedrock. The hazard of windthrow is severe because of the shallow soil depth. Use of conventional equipment normally is not restricted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIIs, nonirrigated. It is in woodland suitability group 4o and in the Mountain Shallow Loam (Ponderosa Pine) woodland site.

91—Tomasaki loam, 3 to 15 percent slopes. This very deep, well drained soil is on glacial outwash fans on the eastern side of the La Sal Mountains. It formed in alluvium derived dominantly from porphyritic diorite. Slopes are less than 50 feet long. The present

vegetation in most areas is mainly ponderosa pine, Gambel oak, snowberry, and Nevada bluegrass. Elevation is 7,800 to 8,600 feet. The average annual precipitation is 17 to 20 inches, the mean annual air temperature is 40 to 42 degrees F, and the average freeze-free period is 70 to 90 days.

Typically, the surface layer is dark brown loam 11 inches thick. The upper 23 inches of the subsoil is yellowish red clay and clay loam, and the lower 16 inches is reddish brown very cobbly clay loam. The substratum to a depth of 60 inches or more is light brown cobbly clay loam.

Included in this unit are 8 percent Toone loam on outwash fans under Gambel oak, 8 percent Sirref loam on outwash fans under mountain big sagebrush, 8 percent Herm clay loam in landslide areas, and 4 percent Falcon fine sandy loam on structural bench rims under ponderosa pine.

Permeability of the Tomasaki soil is slow. Available water capacity is about 8.5 to 10.0 inches. Water supplying capacity is 11 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as woodland, wildlife habitat, rangeland, and recreation areas.

The potential natural plant community on this unit is an overstory of ponderosa pine with a canopy of 30 percent. The understory vegetation is 45 percent grasses, 20 percent forbs, and 35 percent shrubs. Important plants are Gambel oak, muttongrass, elk sedge, and bottlebrush squirreltail.

Suitability for the production of ponderosa pine is good. The site index for ponderosa pine ranges from 60 to 80. Equipment use normally is not restricted in kind or time of year. The seedling mortality rate is low. Planted seedlings have good potential for development without excessive competition.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIe, nonirrigated. It is in woodland suitability group 4o and in the Mountain Loam (Ponderosa Pine) woodland site.

92—Tomasaki loam, 15 to 25 percent slopes. This very deep, well drained soil is on glacial outwash fans on the eastern side of the La Sal Mountains. It formed in alluvium derived dominantly from porphyritic diorite. Slopes are less than 50 feet long. The present vegetation in most areas is mainly ponderosa pine, Gambel oak, snowberry, and Nevada bluegrass. Elevation is 7,800 to 8,600 feet. The average annual precipitation is 17 to 20 inches, the mean annual air temperature is 40 to 42 degrees F, and the average freeze-free period is 70 to 90 days.

Typically, the surface is covered with a mat of needles and twigs 1 inch thick. The surface layer is dark brown loam 6 inches thick. The upper 6 inches of the subsoil is dark brown clay loam, the next 27 inches is yellowish red clay, and the lower part to a depth of 60 inches or more is very cobbly clay.

Included in this unit are 10 percent Tukuhnik loam on benches and cuestas, 10 percent Flygare loam on north-facing side slopes along drainageways under quaking aspen, and 5 percent Falcon fine sandy loam on cuesta rims.

Permeability of this Tomasaki soil is slow. Available water capacity is about 8.5 to 10.0 inches. Water supplying capacity is 11 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used as woodland, wildlife habitat, rangeland, and recreation areas.

The potential natural plant community on the Tomasaki soil is an overstory of ponderosa pine with a canopy of 30 percent. The understory vegetation is 45 percent grasses, 20 percent forbs, and 35 percent shrubs. Important plants are Gambel oak, muttongrass, elk sedge, and bottlebrush squirreltail.

Suitability for the production of ponderosa pine is good. The site index for ponderosa pine is 60 to 80. The seedling mortality rate is low. The risk of erosion in areas disturbed by timber harvesting operations is moderate. Use of conventional equipment is moderately restricted because of slope. Planted seedlings have good potential for development without excessive competition.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIe, nonirrigated. It is in woodland suitability group 4o and in the Mountain Loam (Ponderosa Pine) woodland site.

93—Toone loam, 8 to 20 percent slopes. This very deep, well drained soil is on glacial outwash fans and valley trains on the eastern flank of the La Sal Mountains. It formed in glacial till and outwash alluvium

derived dominantly from porphyritic diorite. Slopes are 50 to 100 feet long and are convex to concave. The present vegetation in most areas is mainly quaking aspen, snowberry, aspen peavine, and bluegrass. Elevation is 8,600 to 9,800 feet. The average annual precipitation is 25 to 30 inches, the mean annual air temperature is 35 to 39 degrees F, and the average freeze-free period is 30 to 50 days.

Typically, the surface is covered with a mat of partially decomposed leaves and twigs about 0.5 inch thick. The upper 18 inches of the surface layer is very dark grayish brown and dark brown loam, and the lower 9 inches is dark brown gravelly loam. The upper 18 inches of the subsoil is reddish yellow very gravelly clay loam, and the lower part to a depth of 60 inches or more is yellowish red very gravelly clay loam and gravelly clay loam.

Included in this unit are 10 percent Flygare loam on north-facing side slopes of fans under quaking aspen, 10 percent Sirref loam on south-facing side slopes of fans under mountain big sagebrush, 10 percent Skylick loam in landslide areas and on fluves under quaking aspen, and 5 percent Toone loam on fan foot slopes under oak.

Permeability of the Toone soil is slow. Available water capacity is about 7.0 to 8.5 inches. Water supplying capacity is 15 to 18 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as woodland, rangeland, and wildlife habitat.

The potential natural plant community on this unit is an overstory of aspen with a canopy of 60 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

Suitability for the production of aspen is fair. The site index for aspen ranges from 60 to 80. The seedling mortality rate is low. Use of conventional equipment normally is not restricted. Plant competition is not likely to prevent natural regeneration of aspen.

The suitability for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIe, nonirrigated. It is in woodland suitability group 3f and in the High Mountain Loam (Aspen) woodland site.

94—Toone-Sirref-Herm complex, 10 to 30 percent slopes. This map unit is in landslide areas and on solifluction lobes in the La Sal Mountains. Slopes are less than 100 feet long and are concave to convex. Elevation is 8,400 to 9,000 feet. The average annual precipitation is 20 to 25 inches, the mean annual air temperature is 41 to 44 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 35 percent Toone loam, 10 to 30 percent slopes, on north-facing side slopes; 30 percent Sirref very cobbly loam, 20 to 30 percent slopes, on south-facing side slopes; 20 percent Herm clay loam, 10 to 30 percent slopes, on solifluction lobes; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent soils that are similar to this Toone loam but are on north-facing side slopes under quaking aspen and 5 percent Frolic loam on fluves under mountain big sagebrush.

The Toone soil is very deep and well drained. It formed in alluvium and landslide deposits derived dominantly from diorite and shale. The present vegetation in most areas is mainly Gambel oak, snowberry, and lupine. Typically, the surface is covered with a mat of partially decayed leaves 1 inch thick. The surface layer is very dark gray loam and dark brown silt loam 25 inches thick. The upper 8 inches of the subsoil is brown gravelly clay loam, and the lower 27 inches is reddish brown very gravelly clay and very stony clay.

Permeability of the Toone soil is slow. Available water capacity is about 6 to 9 inches. Water supplying capacity is 11 to 17 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Sirref soil is very deep and well drained. It formed in alluvium derived dominantly from diorite. The present vegetation in most areas is mainly mountain big sagebrush, antelope bitterbrush, western wheatgrass, and Indian paintbrush. Typically, the surface layer is reddish brown very cobbly loam 9 inches thick. The upper 12 inches of the subsoil is reddish brown gravelly clay-loam and gravelly clay, and the lower 33 inches is yellowish red very gravelly clay and very cobbly clay. The substratum to a depth of 60 inches or more is pink very cobbly clay loam. Depth to a layer of clay accumulation is 9 inches, and depth to a layer of carbonate accumulation is 33 inches.

Permeability of the Sirref soil is slow. Available water

capacity is about 5.0 to 6.5 inches. Water supplying capacity is 10 to 14 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Herm soil is very deep and well drained. It formed in colluvium derived dominantly from shale. The present vegetation in most areas is mainly big sagebrush, squaw apple, antelope bitterbrush, and western wheatgrass. Typically, the surface layer is dark grayish brown clay loam 8 inches thick. The upper 6 inches of the subsoil is grayish brown clay loam, and the lower 28 inches is yellowish brown clay and clay loam. The substratum to a depth of 60 inches or more is light olive brown clay loam.

Permeability of the Herm soil is slow. Available water capacity is about 10 to 11 inches. Water supplying capacity is 16 to 18 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential natural plant community on the Toone and Herm soils is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Important plants are bluegrass, snowberry, Gambel oak, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning and chemical spraying. Gambel oak is very difficult to eradicate.

Suitability for rangeland seeding is fair. The main limitation is slope. Plants suitable for seeding include adapted native plants, smooth brome, orchardgrass, intermediate wheatgrass, and alfalfa.

The potential natural plant community on the Sirref soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are muttongrass, needleandthread, blue grama, mountain big sagebrush, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning and chemical spraying.

Suitability for rangeland seeding is poor. The main limitations are the content of rock fragments in the surface layer and steepness of slope.

This map unit is in capability subclass VIe, nonirrigated. The Toone and Herm soil are in the Mountain Loam (Oak) range site, and the Sirref soil is in the Mountain Stony Loam range site.

95—Trail fine sand, 0 to 5 percent slopes. This very deep, somewhat excessively drained soil is on valley bottoms in Professor Valley. It formed in alluvium derived dominantly from sandstone. Slopes are less than 100 feet long. The present vegetation in most areas is mainly sand sagebrush, sand dropseed, sandhill muhly, and rubber rabbitbrush. Elevation is 4,000 to 5,000 feet. The average annual precipitation is 7 to 9 inches, the mean annual air temperature is 52 to 53 degrees F, and the average freeze-free period is 150 to 170 days.

Typically, the surface layer is reddish brown fine sand about 3 inches thick. The upper 18 inches of the underlying material is reddish brown and yellowish red sand, and the lower part to a depth of 60 inches or more is stratified, reddish brown and yellowish red coarse sand, fine sandy loam, and very fine sandy loam.

Included in this unit are small areas of Thoroughfare fine sandy loam on alluvial terraces, Lithic Torriorthents on interfluves under blackbrush, and Ustic Torripsamments on sand shadows under fourwing saltbush.

Permeability of the Trail soil is rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is less than 1 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as recreational areas, rangeland, irrigated cropland, and wildlife habitat.

The potential natural plant community on this unit is 55 percent grasses, 20 percent forbs, and 25 percent shrubs. Important plants are Indian ricegrass, galleta, fourwing saltbush, dropseed, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The

main limitations are the low annual precipitation, the sandy texture of the surface layer, and the very low available water capacity. Plants suitable for seeding are Indian ricegrass, spike dropseed, and prostrate kochia.

Principal crops grown under irrigation are alfalfa, corn, small grain, peaches, pears, apples, and melons. Average yields per acre per year that can be expected under a high level of management are 7 to 8 tons of alfalfa, 100 bushels of corn, 20 tons of corn silage, 100 bushels of oats or barley, 450 bushels of peaches or apples, 10 tons of cantaloup, and 15 tons of watermelon. The main limitations for growing crops are the hazards of soil blowing and water erosion, the rapid permeability of the soil, and the low available water capacity. Because the water intake rate is rapid, sprinkler or drip irrigation is best suited to the soil in this unit. If furrow irrigation is used, water should be applied at frequent intervals and runs should be short. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

This map unit is in capability subclasses IIIs, irrigated, and VIIs, nonirrigated. It is in the Sandy Bottom range site.

96—Tukuhnik loam, 3 to 10 percent slopes. This deep, well drained soil is on structural benches and cuestas on the eastern side of the La Sal Mountains. It formed in residuum derived dominantly from interbedded sandstone, siltstone, and shale. Slopes are 50 to 100 feet long. The present vegetation in most areas is mainly ponderosa pine, Gambel oak, snowberry, and Oregongrape. Elevation is 7,800 to 8,600 feet. The average annual precipitation is 17 to 20 inches, the mean annual air temperature is 41 to 43 degrees F, and the average freeze-free period is 70 to 90 days.

Typically, the surface layer is brown loam 7 inches thick. The upper 6 inches of the subsoil is reddish brown clay loam, the next 28 inches is reddish brown silty clay loam, and the lower part to a depth of 51 inches is reddish brown silty clay loam and silty clay. Soft siltstone is at a depth of 51 inches. A layer of clay accumulation is at a depth of 13 inches. A layer of carbonate accumulation is at a depth of 34 inches. Depth to bedrock ranges from 40 to 60 inches.

Included in this unit are 10 percent Tomasaki loam on glacial outwash fans, 10 percent Falcon fine sandy loam on cuesta rims, and 5 percent Dranyon sandy loam on fluves and north-facing side slopes under quaking aspen.

Permeability of the Tukuhnik soil is slow. Available water capacity is about 8 to 9 inches. Water supplying capacity is 12 to 16 inches. Effective rooting depth is 40 to 60 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used mainly as woodland, rangeland, and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is an overstory of ponderosa pine with a canopy of 30 percent. The understory vegetation is 45 percent grasses, 20 percent forbs, and 35 percent shrubs. Important plants are Gambel oak, muttongrass, elk sedge, and bottlebrush squirreltail.

Suitability for the production of ponderosa pine is good. The site index for ponderosa pine ranges from 60 to 80. The seedling mortality rate is low. Use of conventional equipment normally is not restricted. Planted seedlings have good potential for development without excessive competition.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

This map unit is in capability subclass VIe, nonirrigated. It is in woodland suitability group 4o and in the Mountain Loam (Ponderosa Pine) woodland site.

97—Ustic Torrifluvents-Ustic Torrifluvents, sodic-Typic Ustifluvents complex, 0 to 6 percent slopes. This map unit is on river and stream terraces and flood plains along the Colorado River, Dolores River, Kane Springs Wash, Indian Creek, and other perennial streams in the survey area. Slopes are 0 to 6 percent, less than 100 feet long, and plane to concave. Elevation is 3,900 to 4,400 feet. The average annual precipitation is 6 to 12 inches, the mean annual air temperature is 53 to 56 degrees F, and the average freeze-free period is 140 to 180 days.

This map unit is 35 percent Ustic Torrifluvents on low stream terraces; 30 percent Ustic Torrifluvents, sodic, on stream terraces; 25 percent Typic Ustifluvents on flood plains; and 10 percent miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are areas of unstabilized sandy and gravelly sediment that are so frequently reworked by streams that they support little or no vegetation and are in areas below the annual high water level. Also included are small areas of Rock outcrop. Included areas make up about 10 percent of the total acreage.

The Ustic Torrifluvents are very deep and well drained. They formed in alluvium derived dominantly from sandstone and shale. The present vegetation in most areas is mainly basin big sagebrush and rubber rabbitbrush. No single profile is typical of these soils, but one commonly observed in the survey area has a surface layer of yellowish red loamy very fine sand 13 inches thick. The underlying material to a depth of 60 inches or more is stratified, yellowish red loamy very fine sand, very fine sandy loam, loam, gravelly sandy loam, and silt loam. The content of rock fragments, texture, and other soil properties vary significantly within short distances.

Permeability of the Ustic Torrifluvents is moderately rapid. Available water capacity is about 6.0 to 7.5 inches. Water supplying capacity is 4.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. These soils are subject to brief periods of flooding in May and June.

The Ustic Torrifluvents, sodic, are very deep and well drained. They formed in alluvium derived dominantly from shale and sandstone. The present vegetation in most areas is mainly black greasewood, seepweed, and alkali sacaton. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of yellowish red loamy very fine sand 3 inches thick. The underlying material to a depth of 60 inches or more is stratified, yellowish red loamy very fine sand, very fine sandy loam, loam, gravelly sandy loam, and silt loam. The content of rock fragments, texture, and other soil properties vary significantly within short distances.

Permeability of the Ustic Torrifluvents, sodic, is moderately rapid. Available water capacity is about 6.0 to 7.5 inches. Water supplying capacity is 4.0 to 6.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is slight to moderate. The hazard of soil blowing is high. These soils are subject to brief periods of flooding in May and June.

The Typic Ustifluvents are very deep and moderately well drained. They formed in alluvium derived dominantly from sandstone and shale. The present vegetation in most areas is mainly Fremont cottonwood, saltcedar, and saltgrass. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of light reddish brown loam 1 inch thick. The underlying material to a depth of 60 inches or more is stratified, pink, light reddish brown, or yellowish red fine sand, loamy very fine sand, loamy fine sand, silt loam, and very gravelly sand. Some pedons are gleyed and mottled. The content of rock fragments, texture, and other soil properties vary significantly within short distances.

Permeability of the Typic Ustifluvents is moderate. Available water capacity is 4.0 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. A seasonal high water table is at a depth of 40 to 60 inches in spring. These soils are subject to frequent, long periods of flooding in May and June. They are saline.

Most areas of this unit are used as rangeland, woodland, and wildlife habitat. A few areas are used as irrigated cropland and for urban development.

The potential plant community on the Ustic Torrifluvents is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are blue grama, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, brush management, rangeland seeding, and proper location of water developments. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is good. Plants suitable for seeding include adapted native plants, Russian wildrye, crested wheatgrass, and ladak alfalfa.

The potential plant community on the Ustic Torrifluvents, sodic, is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Important plants are bottlebrush squirreltail, alkali sacaton, galleta, seepweed, and black greasewood.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the low annual precipitation and the sodicity of the soil.

The potential plant community on the Typic Ustifluvents is 50 percent grasses, 10 percent forbs,

and 40 percent shrubs. Important plants are Fremont cottonwood, coyote willow, inland saltgrass, alkali sacaton, saltcedar, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Prescribed burning can be used to improve the rangeland vegetation.

Principal crops grown on the Ustic Torrifluvents and the Ustic Torrifluvents, sodic, under irrigation are alfalfa, corn, small grain, and melons. Average yields per acre per year that can be expected under a high level of management are 8 tons of alfalfa, 110 bushels of corn, 20 tons of corn silage, 100 bushels of oats or barley, 12 tons of cantaloup, and 16 tons of watermelon. The main limitations for growing crops are the hazards of soil blowing and flooding. Furrow, border, corrugation, and sprinkler irrigation systems are suited to these soils. The method used is governed by the crop. If furrow, border, or corrugation irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. The risk of flooding can be reduced by the use of diversions. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

Principal crops grown on the Typic Ustifluvents under irrigation are alfalfa, corn, small grain, and melons. Average yields per acre per year that can be expected under a high level of management are 8 tons of alfalfa, 110 bushels of corn, 20 tons of corn silage, 100 bushels of oats or barley, 12 tons of cantaloup, and 16 tons of watermelon. The main limitations for growing crops are the hazard of soil blowing, the salinity of the soils, the hazard of flooding, and the high water table. Furrow, border, corrugation, and sprinkler irrigation systems are suited to these soils. The method used generally is governed by the crop grown. If furrow, border, or corrugation irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. The risk of flooding can be reduced by the use of levees. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed. To reduce the saline condition of the soils and to maintain soil productivity, applications of irrigation water should be adjusted to leach excess salts from the root zone. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage.

If the Ustic Torrifluvents and Ustic Torrifluvents, sodic, are used for homesite development, the main limitations are the hazards of soil blowing and flooding. Dikes and channels that have outlets for floodwater can be used to protect buildings and onsite sewage disposal systems from flooding. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing.

If the Typic Ustifluvents are used for homesite development, the main limitations are the hazard of flooding, the seasonal high water table, and the hazard of soil blowing. Drainage is needed for buildings with basements. Septic tank absorption fields do not function properly during periods when the water table is high. Dikes and channels that have outlets for floodwater can be used to protect buildings and onsite sewage disposal systems from flooding. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing.

This map unit is in capability subclasses IVw, irrigated, and VIIs, nonirrigated. The Ustic Torrifluvents are in the Loamy Bottom range site. The Ustic Torrifluvents, sodic, are in the Alkali Flat range site. The Typic Ustifluvents are in the Semiwet Salt Streambank range site.

98—Ustic Torriorthents, warm, 10 to 50 percent slopes. These moderately deep to very deep, well drained soils are on escarpments in the southern part of the Dolores Triangle. These soils formed in colluvium and residuum derived dominantly from interbedded sandstone and shale. Slopes are 100 to 300 feet long, are plane, and face south, east, and west. The present vegetation in most areas is mainly blackbrush, galleta, green rabbitbrush, and Mormon tea. Elevation is 5,000 to 6,000 feet. The average annual precipitation is 10 to 12 inches, the mean annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 120 to 140 days.

No single profile is typical of these soils, but one

commonly observed in the survey area has a surface layer of yellowish brown very cobbly sandy loam 3 inches thick over brown very cobbly loam 8 inches thick. The upper 19 inches of the underlying material is white and very pale brown very gravelly sandy clay loam, and the lower part to a depth of 45 inches is white and yellowish brown cobbly sandy clay loam. Weathered shale is at a depth of 45 inches. Depth to bedrock ranges from 20 to 60 inches or more. The content of rock fragments, texture, and other soil properties may vary significantly within short distances.

Included in this unit are small areas of Rock outcrop, Bluechief fine sandy loam on terraces under fourwing saltbush, Lithic Ustic Torriorthents on benches and cuestas under shadscale, and Badland.

Permeability of the Ustic Torriorthents is moderate. Available water capacity is 2 to 8 inches. Water supplying capacity is 2.0 to 6.5 inches. Effective rooting depth is 20 to 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 40 percent grasses, 10 percent forbs, and 50 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass.

This map unit is in capability subclass VIIe, nonirrigated. It is in the Semidesert Stony Loam (Blackbrush) range site.

99—Ustic Torriorthents-Lithic Torriorthents, warm-Rock outcrop complex, 10 to 80 percent slopes. This map unit is on canyon escarpments and colluvial foot slopes on canyon walls along the Colorado River and its tributaries. Slopes are less than 50 feet long. Elevation is 4,200 to 7,100 feet. The average annual precipitation is 8 to 15 inches, the mean annual air temperature is 45 to 54 degrees F, and the average freeze-free period is 100 to 150 days.

This unit is 35 percent Ustic Torriorthents, 10 to 80 percent slopes, on north-facing side slopes and talus cone foot slopes; 25 percent Lithic Torriorthents, warm, 30 to 50 percent slopes, on south- and west-facing side slopes and narrow ledges; 20 percent Rock outcrop; and 20 percent other soils and miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Nepalto very stony sandy loam on alluvial fans under blackbrush, 5 percent Badland, and 5 percent Rubble land.

The Ustic Torriorthents are moderately deep to very deep and are well drained. They formed in colluvium derived dominantly from sandstone and shale. The present vegetation in most areas is mainly galleta, shadscale, broom snakeweed, and Mormon tea. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of yellowish red very cobbly loamy fine sand 7 inches thick. The underlying material to a depth of 60 inches or more is yellowish red extremely stony fine sandy loam. Depth to bedrock ranges from 20 to 60 inches or more. The content of rock fragments, texture, and other soil properties may vary significantly within short distances.

Permeability of the Ustic Torriorthents is moderate to moderately rapid. Available water capacity is about 2.0 to 7.5 inches. Water supplying capacity is 3 to 7 inches. Effective rooting depth is 20 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is very rapid, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Lithic Torriorthents are shallow and well drained. They formed in residuum and alluvium derived from sandstone and shale. The present vegetation in most areas is mainly blackbrush, shadscale, and galleta. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of yellowish red gravelly fine sandy loam 2 inches thick. The underlying material is yellowish red gravelly fine sandy loam 15 inches thick over sandstone. Depth to bedrock ranges from 4 to 20 inches. The content of rock fragments, texture, and other soil properties may vary significantly within short distances.

Permeability of the Lithic Torriorthents is moderately rapid. Available water capacity is less than 2 inches. Water supplying capacity is 1 to 3 inches. Effective rooting depth is 4 to 20 inches. The organic matter content of the surface layer is less than 1 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Rock outcrop is exposures of sandstone in the form of ledges, cliffs, monoliths, and slickrock.

This unit is used as wildlife habitat and recreation areas.

The potential natural plant community on the Ustic Torriorthents is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, shadscale, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The

main limitations are the rock fragments on the surface and steepness of slope.

The potential natural plant community on the Lithic Torriorthents is 25 percent grasses, 5 percent forbs, and 70 percent shrubs. Important plants are blackbrush, galleta, shadscale, and Indian ricegrass. These soils are not suitable for grazing by livestock because of the steepness of slope.

This map unit is in capability subclass VIII, nonirrigated. The Ustic Torriorthents are in the Talus Slope range site. The Lithic Torriorthents are in the Desert Shallow Sandy Loam (Blackbrush) range site. The Rock outcrop is not assigned to a range site.

100—Ustic Torriorthents-Ustollic Calciorthids complex, 10 to 60 percent slopes. This map unit occurs as landslide areas on escarpments in the Lisbon Valley area, on the flanks of the La Sal Mountains, and below Deerneck Mesa, Iron Canyon Point, Bucks Flat, and Peters Point. Elevation is 5,800 to 7,500 feet. The average annual precipitation is 10 to 14 inches, the mean annual air temperature is 48 to 52 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 45 percent Ustic Torriorthents, 10 to 60 percent slopes, on side slopes; 25 percent Ustollic Calciorthids, 10 to 40 percent slopes, on remnant side slopes; and 30 percent other soils and miscellaneous areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Badland, 10 percent Lithic Ustic Torriorthents on ledges under blackbrush, 5 percent Rock outcrop, and 5 percent Moab very cobbly fine sandy loam on inset fans under blackbrush.

The Ustic Torriorthents are moderately deep to very deep and are well drained. They formed in colluvium derived dominantly from sandstone and shale. Slopes are 50 to 100 feet long and are convex to concave. The present vegetation in most areas is mainly shadscale, Indian ricegrass, and globemallow. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of yellowish brown very cobbly sandy loam 3 inches thick over brown very cobbly loam 8 inches thick. The upper 19 inches of the underlying material is white and very pale brown very gravelly sandy clay loam, and the lower part to a depth of 45 inches is white and yellowish brown cobbly sandy clay loam. Weathered shale is at a depth of 45 inches. The content of rock fragments, texture, and other soil properties may vary significantly within short distances.

Permeability of the Ustic Torriorthents is moderate. Available water capacity is 2 to 8 inches. Water supplying capacity is 3 to 8 inches. Effective rooting depth is 20 to 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Ustollic Calciorthids are moderately deep to very deep and are well drained. They formed in colluvium derived dominantly from sandstone and shale. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly Utah juniper, pinyon, Indian ricegrass, and galleta. No single profile is typical of these soils, but one commonly observed in the survey area has a surface layer of strong brown gravelly fine sandy loam 1 inch thick. The subsoil is strong brown loam and fine sandy loam 7 inches thick. The upper 24 inches of the substratum is light brown gravelly loam, and the lower part to a depth of 40 inches is pink clay loam. Weathered shale is at a depth of 40 inches. A layer of carbonate accumulation is at a depth of 8 to 40 inches. The content of rock fragments, texture, and other soil properties vary significantly within short distances.

Permeability of the Ustollic Calciorthids is moderately slow. Available water capacity is 2 to 8 inches. Water supplying capacity is 3 to 8 inches. Effective rooting depth is 20 to 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used as woodland, rangeland, and wildlife habitat.

The potential natural plant community on the Ustic Torriorthents is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are blackbrush, galleta, Indian ricegrass, shadscale, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the rock fragments on the surface and steepness of slope.

The potential natural plant commuity on the Ustollic Calciorthids is an overstory of Utah juniper and pinyon with a canopy of 10 to 15 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Important plants are galleta, fourwing saltbush, Indian ricegrass, blue grama, and Mormon tea.

The site index for Utah juniper and pinyon is 35. Average yields are 4 cords of wood per acre per year.

The potential for post or Christmas tree production is poor.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Burning can also be used to improve the rangeland vegetation.

Suitability for rangeland seeding is poor. The main limitations for seeding are the low annual precipitation, low available water capacity, and steepness of slope.

This map unit is in capability subclass VIIs, nonirrigated. The Ustic Torriorthents are in the Talus Slope range site. The Ustollic Calciorthids are in woodland suitability group 3r and in the Semidesert Gravelly Loam (Utah Juniper-Pinyon) woodland site.

101—Ustic Torriorthents-Ustollic Haplargids complex, 10 to 60 percent slopes. This map unit occurs as landslide areas on escarpments in the vicinity of Deerneck Mesa, Iron Canyon Point, Bucks Flat, and Peters Point; in Lisbon Valley and Big Indian Valley; and in the Dolores Triangle. Elevation is 5,800 to 7,500 feet. The average annual precipitation is 10 to 14 inches, the mean annual air temperature is 48 to 52 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 45 percent Ustic Torriorthents, 10 to 60 percent slopes; 30 percent Ustollic Haplargids, 10 to 40 percent slopes; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 8 percent Strych very cobbly fine sandy loam on inset fans under pinyon and juniper, 5 percent Rizno fine sandy loam on ledges under pinyon and juniper, 5 percent Rock outcrop, 5 percent Ignacio fine sandy loam on benches under Wyoming big sagebrush, and 2 percent Badland.

The Ustic Torriorthents are moderately deep to very deep and are well drained. They formed in colluvium derived dominantly from sandstone and shale. Slopes are 50 to 100 feet long and are concave to convex. The present vegetation in most areas is mainly Utah juniper, galleta, Indian ricegrass, and globemallow. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of yellowish brown very cobbly sandy loam 3 inches thick over brown very cobbly loam 8 inches thick. The upper 19 inches of the underlying material is white and very pale brown very gravelly sandy clay loam, and the lower part to a depth of 45 inches is white and yellowish brown cobbly sandy clay loam. Weathered shale is at a depth of 45 inches. The content of rock fragments, texture, and other soil properties may vary significantly within short distances.

Permeability of the Ustic Torriorthents is moderate. Available water capacity is 2 to 8 inches. Water supplying capacity is 3 to 8 inches. Effective rooting depth is 20 to 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate. Soil blowing is not a hazard.

The Ustollic Haplargids are moderately deep to very deep and are well drained. They formed in colluvium derived dominantly from sandstone. No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of strong brown stony sandy loam 3 inches thick over reddish brown stony fine sandy loam 5 inches thick. The subsoil is light reddish brown stony sandy clay loam 16 inches thick. The substratum to a depth of 60 inches or more is pink and yellowish red stony silty clay loam. A layer of clay accumulation is at a depth of 8 to 24 inches. The content of rock fragments, texture, and other soil properties may vary significantly within short distances.

Permeability of the Ustollic Haplargids is slow. Available water capacity is 2 to 8 inches. Water supplying capacity is 3.5 to 8.0 inches. Effective rooting depth is 20 to 60 inches or more. The organic matter content of the surface is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is slight. Soil blowing is not a hazard.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential natural plant community on the Ustic Torriorthents is 45 percent grasses, 15 percent forbs, and 40 percent shrubs. Important plants are blackbrush, shadscale, galleta, Indian ricegrass, and Mormon tea.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is very poor. The main limitations are the rock fragments on the surface and steepness of slope.

The potential vegetation on the Ustollic Haplargids is an overstory of pinyon and Utah juniper with a canopy of 20 percent. The understory vegetation is 40 percent grasses, 5 percent forbs, and 55 percent shrubs. Important plants are rock goldenrod, muttongrass, Nevada bluegrass, prairie junegrass, pinyon, and green Mormon tea.

The site index for pinyon and Utah juniper is 75. Average yields are 9 cords of wood per acre per year.

The potential is fair for post or Christmas tree production.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments.

Suitability for rangeland seeding is poor. The main limitations are the rock fragments on the surface and steepness of slope.

This map unit is in capability subclass VIIs, nonirrigated. The Ustic Torriorthents are in the Talus Slope range site. The Ustollic Haplargids are in woodland suitability group 2r and in the Upland Stony Loam (Pinyon-Utah Juniper) woodland site.

102—Waas very fine sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on benches, cuestas, and fans on foothills of the La Sal Mountains. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly Wyoming big sagebrush, Kentucky bluegrass, bulbous bluegrass, and pinyon. Elevation is 7,200 to 7,800 feet. The average annual precipitation is 16 to 20 inches, the mean annual air temperature is 42 to 44 degrees F, and the average freeze-free period is 80 to 100 days.

Typically, the surface layer is reddish brown very fine sandy loam 10 inches thick. The upper 22 inches of the subsoil is yellowish red loam, and the lower 13 inches is reddish brown loam. The substratum to a depth of 60 inches or more is reddish brown loam. A layer of clay accumulation is at a depth of 10 inches.

Included in this unit are 10 percent Hangdo loam on outwash fans under oak, 8 percent Kilfoil Variant cobbly loam on side slopes under oak, 6 percent Sirref loam on fan midslopes, and 4 percent Frolic loam on valley bottoms.

Permeability of the Waas soil is moderately slow. Available water capacity is about 10.0 to 10.5 inches. Water supplying capacity is 11 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as cropland, rangeland, wildlife habitat, recreation areas, and urban development.

The potential natural plant community on this unit is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Important plants are bluegrass, wheatgrass, needleandthread, brome, mountain big sagebrush, and snowberry.

Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is good. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa.

Principal crops grown under irrigation are alfalfa, pasture, and small grain. Average yields per acre per year that can be expected of the principal crops under a high level of management are 3 to 4 tons of alfalfa, 50 bushels of oats or barley, and 3 animal-unit-months of pasture. A suitable rotation is one that includes 6 to 8 years of alfalfa or improved pasture and 2 or 3 years of small grain. Sprinkler irrigation is the most suitable method of applying water. Use of this method permits the even, controlled application of water, reduces runoff, and minimizes the risk of erosion. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

Winter wheat and spring wheat are the principal nonirrigated crops. Average yields per acre per year that can be expected of the principal crops under a high level of management are 20 to 22 bushels of winter wheat and 14 to 16 bushels of spring wheat. The main limitations for growing crops are droughtiness, the hazard of soil blowing, and the hazard of water erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Soil blowing can be reduced by returning crop residue to the soil and by using conservation tillage practices such as stubble mulch tillage. Erosion can be reduced if fall grain is seeded early, stubble mulch tillage is used, and tillage and seeding are on the contour or across the slope. Waterways should be shaped and seeded to perennial grass.

This unit is well suited to homesite development. It has few limitations. Preserving the existing plant cover during construction helps to control erosion. Excavation for houses and access roads in places exposes material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems.

This map unit is in capability subclass IIIe, irrigated and nonirrigated. It is in the Mountain Loam range site.

103—Windwhistle very fine sandy loam, 1 to 6 percent slopes. This moderately deep, well drained soil is on structural benches and cuestas in Dry Valley and on Hatch Point. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long, and they face north, west, or east. The present vegetation in most areas is mainly big sagebrush, blue grama, winterfat, and fourwing saltbush. Elevation is 5,700 to 6,300 feet. The average annual precipitation is 12 to 14 inches, the mean annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 130 days.

Typically, the surface layer is yellowish red very fine sandy loam 2 inches thick. The subsoil is yellowish red very fine sandy loam 18 inches thick. The upper part of the substratum is yellowish red very fine sandy loam 5 inches thick, and the lower part to a depth of 38 inches is light reddish brown loamy very fine sand. Fractured sandstone is at a depth of 38 inches. Depth to bedrock ranges from 20 to 40 inches. A layer of clay accumulation is at a depth of 2 to 13 inches.

Included in this unit are 15 percent Begay fine sandy loam, moist, in depressional areas and on north-facing side slopes, 5 percent Sazi very fine sandy loam along wash escarpments under grasses, 5 percent Ignacio fine sandy loam scattered throughout the unit under grasses, and 2 percent Strych very cobbly fine sandy loam on fan remnants.

Permeability of the Windwhistle soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 5 to 7 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used mainly as rangeland and wildlife habitat. It is also used as recreation areas.

The potential natural plant community on this unit is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Important plants are Wyoming big sagebrush, Indian ricegrass, needleandthread, and blue grama. Pinyon and Utah juniper may invade areas where the potential plant community has been depleted.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation.

Suitability for rangeland seeding is fair. The main limitations are the low annual precipitation and moderate depth to bedrock. Plants suitable for seeding include adapted native plants, intermediate wheatgrass, pubescent wheatgrass, crested wheatgrass, alfalfa, small burnet, and prostrate kochia.

This map unit is in capability subclass VIe, nonirrigated. It is in the Upland Loam range site.

104—Windwhistle-Sazi very fine sandy loams, 1 to 3 percent slopes. This map unit is on structural benches and cuestas in Dry Valley. It formed in eolian deposits derived dominantly from sandstone. Slopes are 100 to 300 feet long. The present vegetation in most areas is mainly blue grama, galleta, fourwing saltbush, and winterfat. Elevation is 5,600 to 6,000 feet. The average annual precipitation is 9 to 12 inches, the mean annual air temperature is 49 to 51 degrees F, and the average freeze-free period is 120 to 140 days.

This unit is 40 percent Windwhistle very fine sandy loam, dry, 1 to 3 percent slopes, on concave depositional eolian sheets; 35 percent Sazi very fine sandy loam, 1 to 3 percent slopes, on convex eolian sheets; and 25 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are 10 percent Begay fine sandy loam, 10 percent Mivida fine sandy loam on cuestas, 3 percent Ignacio fine sandy loam, dry, and 2 percent Mido loamy fine sand on sand drifts.

The Windwhistle soil is moderately deep and well drained. Typically, the surface layer is yellowish red very fine sandy loam 2 inches thick. The subsoil is yellowish red very fine sandy loam 18 inches thick. The upper part of the substratum is yellowish red very fine sandy loam 5 inches thick, and the lower part to a depth of 38 inches is light reddish brown loamy very fine sand. Fractured sandstone is at a depth of 38 inches. Depth to bedrock ranges from 20 to 40 inches. A layer of clay accumulation is at a depth of 2 to 13 inches.

Permeability of the Windwhistle soil is moderately rapid. Available water capacity is about 4.0 to 5.5 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Sazi soil is moderately deep and well drained. Typically, the surface layer is yellowish red very fine sandy loam 2 inches thick. The subsoil is yellowish red very fine sandy loam 15 inches thick. The substratum to a depth of 32 inches is light reddish brown very fine sandy loam. Sandstone is at a depth of 32 inches.

Depth to bedrock ranges from 20 to 40 inches. A layer of carbonate accumulation is at a depth of 17 to 32 inches.

Permeability of the Sazi soil is moderately rapid. Available water capacity is about 3.5 to 5.0 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used as rangeland and wildlife habitat.

The potential natural plant community on this unit is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Important plants are needleandthread, Indian ricegrass, and fourwing saltbush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, planned grazing systems, and proper location of water developments. Brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

Suitability for rangeland seeding is poor. The main limitation is the low annual precipitation. Plants suitable for seeding include adapted native plants, crested wheatgrass, and ladak alfalfa.

This map unit is in capability subclass VIIe, nonirrigated. The Windwhistle and Sazi soils are in the Semidesert Sandy Loam range site.

Prime Farmland

In this section, prime farmland is defined and discussed and the prime farmland soils in this survey area are listed.

Prime farmland is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and length of growing season are favorable, and level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

The following map units meet the soil requirements for prime farmland when irrigated. The location of each map unit is shown on the detailed soil maps at the back of this publication. Soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

3	Barnum loam, 0 to 3 percent slopes
30	Frolic loam, 2 to 6 percent slopes
43	Jocity loam, 2 to 4 percent slopes
64	Redbank fine sandy loam, 0 to 3 percent slopes
66	Redbank fine sandy loam, dry, 0 to 3 percent slopes
88	Thoroughfare fine sandy loam, 2 to 8 percent slopes
102	Waas very fine sandy loam, 2 to 8 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management needed for crops and for hay and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants commonly grown are discussed.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Less than 0.5 percent of the survey area is used as cropland. Most of the cropland is along the canyon floors and valley bottoms of the major drainageways and on the high benches that skirt the La Sal Mountains. Nearly all of the cropland is irrigated. Alfalfa is the main irrigated crop. Small grain and corn are grown in rotation with alfalfa. Specialty crops grown under irrigation in the Castle Valley and Moab-Spanish Valley areas include apples, peaches, pears, and melons. Nonirrigated crops grown on the high benches where annual precipitation is more than 15 inches include winter wheat, spring wheat, and pinto beans.

Soil erosion is a major management consideration on irrigated cropland that has slopes of more than 3 percent and on nonirrigated cropland. The capability of the soil to produce crops is substantially reduced in areas where the surface layer has been eroded by wind and water.

Using water efficiently, distributing water uniformly, protecting the soil from erosion, and maintaining soil fertility are the main management objectives on irrigated soils. Border, corrugation, and furrow irrigation are suited to loamy soils that have slopes of 0 to 3 percent. Land leveling is needed for uniform distribution of water and to reduce runoff and erosion. Sprinkler irrigation commonly is used on the more sloping soils and on sandy soils. Soil blowing can be controlled on the sandy soils by leaving crop residue on the surface and by using cover crops. Water erosion as a result of the tracks made by wheel sprinkler systems can be controlled by using grass for cover, by placing gravel in

the tracks, and, on some fields, by keeping the wheel tracks on the contour or across the slope. Drip irrigation is well suited to orchard and garden crops.

Controlling soil blowing and water erosion and conserving soil moisture are the major management concerns on nonirrigated cropland. Because of the limited precipitation, a crop-fallow rotation system is used. Soils that have a sandy loam or loamy sand surface layer are highly susceptible to soil blowing. Loamy soils in more sloping areas are susceptible to water erosion as a result of surface runoff and during intense rainfall.

Stubble mulch tillage, minimum tillage, and use of crop residue protect fallowed soils from soil blowing and water erosion and allow them to readily absorb and retain moisture. Properly designed contour terraces and grassed waterways effectively control runoff and reduce water erosion.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are given in the section "Detailed Soil Map Units" for those soils that commonly are cropped. In any given year, yields may be higher or lower than those indicated because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those given in the map units are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(28)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils generally are grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make

them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Rangeland and Woodland Understory Vegetation

About 75 percent of the survey area is rangeland or grazable woodland. Most of the other 25 percent is Rock outcrop or other miscellaneous areas that support little if any vegetation. Other small areas of cropland, dense forest land, and urban land are not used as rangeland. All soils that produce or have the potential to produce forage for livestock or wildlife are considered to be rangeland. Cow-calf operations are the dominant livestock industry. One or two bands of sheep graze the soils in the survey area for part of the year.

Soils strongly influence the kind and amount of natural vegetation. Shallow or sandy soils on the arid canyon floors and valley bottoms support shrubs such as blackbrush, shadscale, and sand sagebrush. Total annual production of forage is greater on the deeper, loamy soils that support galleta, Indian ricegrass, blue grama, and fourwing saltbush. Shallow soils on the semiarid tablelands support pinyon and Utah juniper. Deeper soils support stands of blue grama, galleta, Indian ricegrass, and fourwing saltbush.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on grazing sites are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 4 shows, for each soil, the grazing site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as grazing sites or are suited to use as grazing sites are listed. Explanation of the column headings in table 4 follows.

A *grazing site* is a distinctive kind of land that produces a characteristic natural plant community that differs from natural plant communities on other grazing sites in kind, amount, and proportion of forage plants. The relationship between soils and vegetation was established during this survey; thus, grazing sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of forage plants. Soil reaction, salt content, and a seasonal water table are also important.

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees. The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Total production is the amount of vegetation that can be expected to grow annually on well managed land that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. Because only key species are listed, the percentages do not necessarily total 100. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally, all of the vegetation produced is not used.

Grazing site management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present condition. Grazing site condition is determined by comparing the present plant community with the potential natural plant community on a particular grazing site. The more closely the existing community resembles the potential community, the better the grazing site condition. Grazing site condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in grazing site management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. About 50 percent of the seasonal growth should remain at the end of the grazing period. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a grazing site condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The rangeland and grazable woodland in this survey area represent many different native plant communities, or grazing sites. These sites may receive different amounts of precipitation and have different soil properties and parent material. Annual precipitation ranges from 6 inches on the desert sites to 40 inches on the high mountain sites.

Deferring grazing helps to improve or maintain the condition of a grazing site. Grazing should be deferred during the main part of the growing season of key plants to allow them to produce seed. Fencing, using livestock trails, properly locating water developments, salting, and herding help to achieve more uniform grazing distribution.

Furrowing, chiseling, and pitting can be used to capture runoff water, improve the water intake rate, prevent erosion, and speed recovery of vegetation in areas where the grazing site condition is poor or fair. Seeding can be used to convert nonirrigated cropland to rangeland or to improve depleted grazing sites. Brush control is beneficial in areas where the proportion of shrubs is greater than it is in the potential plant community.

Sound grazing site management can result in increased productivity of the grazing sites in this survey area.

Woodland Management and Productivity

Woodland makes up about 25 percent of the survey area. Most of the woodland is "pygmy forests" of pinyon and Utah juniper on shallow soils on mesa rims and cuestas and on deep, stony soils on alluvial fans and talus cones at elevations of 5,000 to 7,400 feet. Ponderosa pine, quaking aspen, subalpine fir, and Engelmann spruce are the most common trees on the slopes of the La Sal Mountains from an elevation of about 8,000 feet to timberline at about 11,000 feet.

The main products from pinyon and juniper are firewood, fenceposts, and Christmas trees. Demand for firewood has greatly increased in recent years. In the past the propagation of these trees has been controlled to slow their invasion of grassland. With good management the "pygmy forests" can sustain firewood production and allow for improvement of rangeland at the same time.

Most of the ponderosa pine of commercial value has been cut for lumber. Small blocks of aspen, fir, and spruce have also been harvested. Stands of existing commercial woodland can be improved by thinning mature trees and undesirable species. Planting seedlings and controlling fire, insects, and disease also help to improve or reestablish stands. The local offices of the Soil Conservation Service, State Division of Forestry, and Forest Service can help to determine specific woodland management needs.

Recreation

The survey area has many areas of scenic, geologic, and historic interest. These areas are used for camping, hiking, hunting, fishing, sightseeing, picnicking, boating, and operating off-road vehicles. More than 90 percent of the survey area is public land that is available for these uses. Areas that have been set aside for protection or limited use include Canyonlands National Park, Dead Horse Point State Park, Newspaper Rock State Historical Monument, Glen Canyon National Recreation Area, and Dark Canyon Primitive Area.

Campgrounds, picnic areas, and trails have been developed in most of these areas. An extensive network of off-road vehicle trails, most of which are limited to travel by four-wheel-drive vehicles or motorbikes, gives access to the canyons, rims, mesas, and mountain passes. The main management concern is the risk of erosion, which is accelerated in areas where vehicle tracks leave channels in the soil surface. Relocating trails, diverting runoff, and closing and revegetating eroded trails help to control erosion.

Whitewater rafting is popular on the Green, Colorado, and Dolores Rivers. The natural beauty of the river canyons and the intensively used, undeveloped campsites are protected by a "leave it as you found it" policy.

The soils of the survey area are rated in table 5 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 5, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 5 can be supplemented by other information in this survey; for example, interpretations for dwellings without basements and for local roads and streets in table 7 and interpretations for septic tank absorption fields in table 8.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

The survey area provides natural habitat for a variety of fish and wildlife. The main large mammals that inhabit the area are elk, mule deer, desert bighorn sheep, pronghorn antelope, black bear, mountain lion, bobcat, and coyote. The small mammals include porcupine, skunk, cottontail, jackrabbit, prairie dog, marmot, beaver, pika, pocket gopher, and several species of mice, rats, and bats. The elk, black bear, porcupine, marmot, and pika are mountain dwellers. Pronghorn antelope inhabit the broad treeless benches, and desert bighorn sheep use the remote desert canyons. Mule deer, skunk, and coyote inhabit most of the entire area. Beavers build their dams on the

streams and major rivers. Birds are plentiful and are mostly concentrated near water. Raptors in the area include turkey vultures, Cooper's hawk, red-tailed hawk, golden eagle, and prairie falcon. Migratory waterfowl, mallard ducks, Canadian geese, whistling swan, and green-winged teal commonly inhabit the rivers and wetland areas in fall and spring. Other game birds include blue grouse, ruffed grouse, sage grouse, Gambel quail, ring-necked pheasant, chukar, wild turkey, and mourning dove. Innumerable songbirds, shore birds, hummingbirds, owls, jays, and woodpeckers reside in the area. Lizards and toads are numerous in the arid and semiarid areas.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 6, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are wild millet, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include prairie dog, pocket gopher, meadowlark, cottontail, and skunk.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants, or both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, thrushes, woodpeckers, squirrels, porcupine, raccoon, deer, elk, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and coyote.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps and soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 7 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or

site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 8 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 8 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material

beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 8 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage because of rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 8 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 9 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The

thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 9, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 10 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable

material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 11 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 to 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added; for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials *(1)* and the Unified soil classification system *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification; for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard

Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 12 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil

moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the amount of stable aggregates 0.84 millimeters in size. These are represented idealistically by USDA textural classes. Soils containing rock fragments can occur in any group.

1. Sand, fine sand, and very fine sand. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish on them.

2. Loamy sand, loamy fine sand, and loamy very fine sand. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Sandy loam, coarse sandy loam, fine sandy loam, and very fine sandy loam. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clay, silty clay, clay loam, and silty clay loam that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loam and sandy clay that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loam. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loam that is less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 12, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 13 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained

sand or gravelly sand. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potenital) when thoroughly wet. These consist chiefly of clay that has high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered to be flooding. Standing water in swamps and marshes or in closed depressional areas is considered to be ponding.

Table 13 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of flooding are estimated. Frequency is expressed as *none, rare, occasional,* and *frequent*. *None* means that flooding is not probable, *rare* that it is unlikely but is possible under unusual weather conditions (chance of flooding in any year is 0 to 5 percent), *occasional* that it occurs infrequently under normal weather conditions (chance of flooding in any year is 5 to 50 percent), and *frequent* that it occurs often under normal weather conditions (chance of flooding in any year is more than 50 percent).

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that flooding is most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic flood. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 13 are the depth to the seasonal high water table; the kind of water table—that is, *perched, artesian,* or *apparent*; and the months of the year that the water table usually is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower water table by a dry zone.

The two numbers in the column "High water table" indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A cemented pan is a cemented or indurated subsurface layer at a depth of 5 feet or less. Such a pan causes difficulty in excavation. Pans are classified

as thin or thick. A *thin* pan is one that is less than 3 inches thick if continuously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A *thick* pan is one that is more than 3 inches thick if continuously indurated or more than 18 inches thick if it is discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(31)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 14 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Aridisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Orthid (*Orth*, meaning common, plus *id*, from Aridisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Calciorthids (*Calci*, meaning lime, plus *orthid*, the suborder of the Aridisols that has a calcic horizon).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Ustollic* identifies the subgroup that has a higher summer moisture regime than typifies the great group. An example is Ustollic Calciorthids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, mesic Ustollic Calciorthids.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (27)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (31)*. Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Anasazi Series

The Anasazi series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on benches and cuestas. Elevation is 6,500 to 7,000 feet. Slopes are 3 to 15 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 45 to 47 degrees F.

These Anasazi soils are classified as coarse-loamy, mixed, mesic Ustollic Calciorthids.

Typical pedon of an Anasazi gravelly loam in an area of Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes, about 5 miles south of La Sal; 1,000 feet north and 2,000 feet west of the southeast corner of sec. 27, T. 29 S., R. 24 E.

A1—0 to 9 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable; common very fine and fine roots and few medium roots; 20 percent pebbles; slightly calcareous; carbonates are disseminated; mildly alkaline (pH 7.8); clear smooth boundary.

B2ca—9 to 14 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots and common fine and medium roots; common fine and medium tubular pores; 25 percent pebbles; moderately calcareous; carbonates occur as pendants on rock fragments; moderately alkaline (pH 8.4); clear wavy boundary.

C1ca—14 to 21 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky; few very fine and fine roots; 20 percent pebbles and 5 percent cobbles; strongly calcareous; carbonates in common seams; strongly alkaline (pH 8.6); clear wavy boundary.

C2ca—21 to 26 inches; pinkish white (7.5YR 8/2) gravelly fine sandy loam, pink (7.5YR 7/4) moist; massive; hard, very friable; few very fine and fine roots; strongly calcareous; carbonates in nodules; strongly alkaline (pH 8.8); abrupt smooth boundary.

R—26 inches; sandstone.

Depth to secondary carbonates is 7 to 20 inches. The particle size control section averages 10 to 18 percent clay and 15 to 35 percent rock fragments. Depth to bedrock is 20 to 40 inches. The profile has hue of 7.5YR or 5YR.

The A horizon is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

The B horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 4 to 6. It is gravelly loam or gravelly fine sandy loam. This horizon is moderately alkaline or strongly alkaline.

The Cca horizon has value of 6 to 8 when dry and 5 to 7 when moist, and it has chroma of 2 to 6. It is gravelly loam or gravelly fine sandy loam. This horizon is moderately alkaline or strongly alkaline.

Arches Series

The Arches series consists of shallow, well drained, rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on benches and cuestas. Elevation is 4,700 to 4,900 feet. Slopes are 2 to 8 percent. Average annual precipitation is 6 to 9 inches, and mean annual air temperature is 52 to 54 degrees F.

These Arches soils are classified as mixed, mesic Lithic Torripsamments.

Typical pedon of an Arches fine sand in an area of Arches-Sheppard-Rock outcrop complex, 2 to 8 percent slopes, about 6 miles east of the confluence of the Green and Colorado Rivers; 1,700 feet south and 1,500 feet west of the northeast corner of sec. 12, T. 30 S., R. 19 E.

A1—0 to 4 inches; yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6) moist; single grain; loose; few very fine and fine roots; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

C—4 to 19 inches; reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6) moist; single grain; loose; few very fine and fine roots; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

R—19 inches; calcareous sandstone.

Depth to sandstone is 10 to 20 inches. The profile has hue of 2.5YR or 5YR, value of 5 or 6 when dry, and chroma of 5 or 6. It is loamy sand or fine sand. It is mildly alkaline or moderately alkaline.

Barnum Series

The Barnum series consists of very deep, well drained, moderately slowly permeable soils that formed in alluvium derived dominantly from sandstone. These soils are on valley floors. Elevation is 5,700 to 6,600 feet. Slopes are 0 to 8 percent. Average annual precipitation is 10 to 14 inches, and mean annual air temperature is 46 to 51 degrees F.

These Barnum soils are classified as fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of Barnum loam, 0 to 3 percent slopes, about 1.5 miles northeast of Ogden Center; 1,500 feet north and 2,600 feet east of the southwest corner of sec. 13, T. 31 S., R. 23 E.

A1—0 to 3 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; weak thin platy structure; loose, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; many fine and very fine pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

C1—3 to 7 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; moderate medium platy structure; slightly hard, friable, sticky and slightly plastic; common very fine, fine, and medium pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

C2—7 to 26 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and slightly plastic; many very fine and fine roots and few medium roots; few very fine pores and many fine, medium, and coarse pores; few thin clay films on ped faces, lining root channels, and in pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); gradual smooth boundary.

C3—26 to 33 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; massive; soft, friable; few very fine, fine, and medium roots; common very fine and fine pores and few medium and coarse pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); abrupt smooth boundary.

C4—33 to 49 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure; slightly hard, friable, very sticky and slightly plastic; few very fine, fine, and medium roots; common very fine and fine pores and few medium and coarse pores; moderately calcareous; carbonates are in filaments and are disseminated; moderately alkaline (pH 8.4); gradual smooth boundary.

C5—49 to 68 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; massive; soft, very friable; few very fine and fine roots; common very fine and fine pores and few medium and coarse pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2).

The Barnum soils are calcareous throughout, but carbonates are leached from the upper few inches in some pedons. The particle size control section commonly is 18 to 35 percent clay, although clay content in some thin strata may exceed this range.

The A horizon has hue of 5YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 3 to 6. It dominantly is loam or silty clay loam. This horizon is noncalcareous to moderately calcareous and is moderately alkaline or strongly alkaline.

The C horizon has hue of 5YR, value of 4 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 6. It dominantly is silty clay loam, sandy clay loam, fine sandy loam, loam, or loamy fine sand. This horizon is slightly calcareous to strongly calcareous and is mildly alkaline to strongly alkaline.

Barx Series

The Barx series consists of very deep, well drained, moderately slowly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on mesas, benches, and cuestas and in broad valleys. Elevation is 5,700 to 7,500 feet. Slopes are 3 to 8 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 46 to 48 degrees F.

These Barx soils are classified as fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Barx fine sandy loam, 3 to 8 percent slopes, in Fisher Valley; 2,150 feet south and 100 feet west of the northeast corner of sec. 2, T. 25 S., R. 24 E.

A1—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; moderate medium platy structure; soft, very friable; common very fine and few fine roots; few very fine tubular pores; moderately alkaline (pH 8.0); abrupt smooth boundary.

B21t—2 to 18 inches; yellowish red (5YR 4/6) loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine tubular pores; few moderately thick clay films on faces of peds; moderately alkaline (pH 8.0); clear smooth boundary.

B22t—18 to 24 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; few thin clay films on faces of peds; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

B3ca—24 to 29 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 5/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; moderately calcareous; carbonates in few fine irregular soft masses; strongly alkaline (pH 8.6); clear smooth boundary.

C1ca—29 to 47 inches; pink (5YR 7/4) fine sandy loam, light reddish brown (5YR 6/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine pores; strongly calcareous; carbonates in common medium soft masses and beds; strongly alkaline (pH 8.8); gradual smooth boundary.

C2ca—47 to 60 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish yellow (5YR 6/6) moist; massive; hard, friable; few very fine roots; common very fine and few fine pores; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 9.0).

The calcic horizon is at a depth of 20 to 32 inches. The profile has hue of 5YR or 7.5YR.

The A horizon has value of 5 or 6 when dry and chroma of 4 to 6. This horizon is mildly alkaline or moderately alkaline.

The B2t horizon has value of 4 or 5 when dry and chroma of 4 to 6. Texture is loam or sandy clay loam, and clay content ranges from 19 to 27 percent.

The Cca horizon has value of 6 to 8 when dry and chroma of 4 to 6. Texture is fine sandy loam, sandy clay loam, or loam. This horizon is moderately alkaline or strongly alkaline.

Begay Series

The Begay series consists of very deep, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are in broad valleys and on structural benches and cuestas. Elevation is 5,200 to 7,400 feet. Slopes are 2 to 15 percent. Average annual precipitation is 9 to 14 inches, and mean annual air temperature is 45 to 51 degrees F.

These Begay soils are classified as coarse-loamy, mixed, mesic Ustollic Camborthids.

Typical pedon of Begay fine sandy loam, 2 to 6 percent slopes, about 3 miles northeast of Rone Bailey Mesa; 1,500 feet north and 300 feet west of the southeast corner of sec. 5, T. 30 S., R. 23 E.

A1—0 to 3 inches; yellowish red (5YR 4/6) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine platy structure; soft, very friable; many very fine and fine roots; noncalcareous; moderately alkaline (pH 8.2); abrupt smooth boundary.

B2—3 to 15 inches; yellowish red (5YR 4/6) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable; many very fine and fine roots and few medium roots; common very fine and fine pores; noncalcareous; moderately alkaline (pH 8.4); clear smooth boundary.

B3—15 to 25 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable; common very fine and fine roots; few very fine, fine, and medium pores; slightly calcareous; strongly alkaline (pH 8.6); clear smooth boundary.

C1—25 to 32 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; common very fine and fine roots; common very fine and fine pores; slightly calcareous; strongly alkaline (pH 8.6); gradual smooth boundary.

C2ca—32 to 56 inches; yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6) moist; massive; soft, very friable; common very fine and fine roots; common very fine and fine pores; slightly calcareous; carbonates in veins; strongly alkaline (pH 8.8); clear smooth boundary.

C3ca—56 to 66 inches; yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6) moist; massive; slightly hard, very friable; few very fine and fine roots; few very fine and fine pores; slightly calcareous; carbonates in veins; strongly alkaline (pH 9.0).

Depth to bedrock is more than 60 inches. The particle size control section is 8 to 18 percent clay.

The A horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4 to 6. It is fine sandy loam or loamy fine sand. This horizon is mildly alkaline or moderately alkaline.

The B2 horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4 to 6 when dry and 4 to 8 when moist. It is fine sandy loam, loamy fine sand, or very fine sandy loam. Structure commonly is weak or moderate, medium or coarse, and prismatic parting to weak or moderate, medium, and subangular blocky. This horizon is noncalcareous or slightly calcareous and is moderately alkaline or strongly alkaline.

The C horizon has hue of 2.5YR or 5YR, value of 5 to 8 when dry and 4 to 6 when moist, and chroma of 4 to 6. It is dominantly fine sandy loam, but in some pedons it ranges to loamy fine sand or very fine sandy loam in the lower part of the particle size control section. The C horizon is slightly calcareous to strongly calcareous and is mildly alkaline to strongly alkaline.

Beje Series

The Beje series consists of shallow, well drained, moderately permeable soils that formed in reworked eolian deposits derived dominantly from sandstone. These soils are on benches, mountainsides, and escarpments. Elevation is 7,600 to 8,200 feet. Slopes are 2 to 15 percent. Average annual precipitation is 16 to 20 inches, and mean annual air temperature is 41 to 44 degrees F.

These Beje soils are classified as loamy, mixed Lithic Argiborolls.

Typical pedon of a Beje loam in an area of Bookcliff Variant-Beje complex, 2 to 15 percent slopes, about 5 miles north of Pace Lake on Dolores Point; 350 feet north and 2,000 feet east of the southwest corner of sec. 16, T. 25 S., R. 26 E.

A1—0 to 7 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; moderate coarse platy structure parting to moderate medium granular; soft, very friable; many very fine and fine roots and few medium and coarse roots; few fine pores; noncalcareous; mildly alkaline (pH 7.4); abrupt smooth boundary.

B2t—7 to 19 inches; brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, slightly sticky and plastic; common very fine roots, few fine roots, and many medium and coarse roots; many very fine pores, common fine pores, and few medium pores; common moderately thick clay films on faces of peds; 13 percent pebbles; noncalcareous; mildly alkaline (pH 7.6); abrupt smooth boundary.

R—19 inches; sandstone.

Depth to sandstone is 10 to 20 inches. The mollic epipedon is 7 to 16 inches thick. The particle size control section is 0 to 35 percent rock fragments. The argillic horizon is 5 to 12 inches thick. The profile has hue of 7.5YR or 10YR.

The A horizon has value of 3 or 4 when dry and chroma of 2 or 3. This horizon is neutral or mildly alkaline.

The B2t horizon has value of 3 or 4 when dry or moist, and it has chroma of 2 or 3. Texture is sandy clay loam or clay loam. This horizon is mildly alkaline or moderately alkaline.

Bluechief Series

The Bluechief series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in alluvium derived dominantly from sandstone. These soils are on fan terraces. Elevation is 4,000 to 5,200 feet. Slopes are 1 to 8 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 52 to 54 degrees F.

These Bluechief soils are classified as coarse-loamy, mixed, mesic Typic Calciorthids.

Typical pedon of Bluechief fine sandy loam, 1 to 8 percent slopes, about 2 miles north of North Sixshooter Peak; 1,500 feet south and 1,500 feet west of the northeast corner of sec. 19, T. 30 S., R. 21 E.

A1—0 to 3 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak fine granular structure; soft; common very fine and fine roots; common very fine and few fine pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); clear smooth boundary.

B21—3 to 17 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; moderate coarse subangular blocky structure; slightly hard, very friable; common very fine and fine roots; common very fine and fine pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear wavy boundary.

B22—17 to 25 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky; common very fine and few fine roots; many very fine, common fine, and few medium pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); clear smooth boundary.

Cca—25 to 38 inches; light reddish brown (5YR 6/4)

fine sandy loam, yellowish red (5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; strongly calcareous; carbonates in beds and veins; strongly alkaline (pH 8.8); abrupt smooth boundary.

R—38 inches; sandstone.

Depth to bedrock ranges from 20 to 40 inches.

The A1 horizon typically is fine sandy loam but ranges to loamy fine sand. It is slightly calcareous or moderately calcareous.

The B2 horizon mainly has moderate, medium to coarse, and subangular blocky structure, but it has weak, medium, and subangular blocky structure or moderate, fine, and subangular blocky structure in some pedons. The B2 horizon is moderately alkaline or strongly alkaline.

The Cca horizon is fine sandy loam or loamy fine sand.

Bluehon Series

The Bluehon series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in mixed alluvium derived dominantly from igneous and sedimentary rock. These soils are on alluvial fans. Elevation is 4,800 to 7,000 feet. Slopes are 2 to 15 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 45 to 47 degrees F.

These Bluehon soils are classified as loamy-skeletal, carbonatic, mesic Petrocalcic Calciustolls.

Typical pedon of Bluehon stony loam, 2 to 15 percent slopes (fig. 5), in the Amasas Back area; about 2,600 feet north and 2,000 feet east of the southwest corner of sec. 25, T. 27 S., R. 23 E.

A1—0 to 5 inches; reddish brown (5YR 5/3) stony loam, dark reddish brown (5YR 3/2) moist; weak medium platy structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; few very fine, fine, and medium pores; 10 percent stones, 15 percent cobbles, and 10 percent pebbles; slightly calcareous; mildly alkaline (pH 7.8); clear smooth boundary.

B2ca—5 to 10 inches; dark reddish gray (5YR 4/2) cobbly sandy clay loam, dark reddish gray (5YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium

Figure 5.—Typical profile of Bluehon stony loam, 2 to 15 percent slopes. An indurated, calcium carbonate cemented hardpan is at a depth of 33 inches.

roots and few coarse roots; common very fine and fine pores and few medium pores; 5 percent stones,

10 percent cobbles, and 10 percent pebbles; slightly calcareous; carbonates occur as thin coatings on the underside of rock fragments; moderately alkaline (pH 8.0); clear wavy boundary.

B3ca—10 to 15 inches; pinkish gray (5YR 6/2) very cobbly sandy clay loam, dark reddish gray (5YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and fine pores; 5 percent stones, 15 percent cobbles, and 20 percent pebbles; strongly calcareous; carbonates occur as concretions and thick coatings on rock fragments; moderately alkaline (pH 8.2); clear wavy boundary.

C1ca—15 to 33 inches; pinkish white (5YR 8/2) very cobbly sandy loam, pinkish gray (5YR 6/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine pores; 5 percent stones, 20 percent cobbles, and 20 percent pebbles; very strongly calcareous; carbonates occur as beds and thick coatings on rock fragments; moderately alkaline (pH 8.2); abrupt wavy boundary.

C2cam—33 inches; indurated, calcium carbonate cemented hardpan.

Thickness of the solum is 9 to 15 inches. Depth to the hardpan is 20 to 40 inches.

The A horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 2 to 4. It dominantly is stony loam or very gravelly sandy loam but ranges to cobbly loam or cobbly sandy loam. It is 20 to 35 percent rock fragments.

The B horizon has value of 4 to 6 when dry and 4 or 5 when moist, and it has chroma of 3 or 4. It dominantly is cobbly sandy clay loam or gravelly loam but ranges to very gravelly sandy clay loam or very cobbly sandy clay loam. This horizon averages 35 to 50 percent rock fragments.

The C horizon ranges from very cobbly sandy loam to very gravelly loam. It is 40 to 60 percent rock fragments.

Bond Series

The Bond series consists of shallow, well drained, moderately slowly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on structural benches and cuestas. Elevation is 6,000 to 7,200 feet. Slopes are 2 to 70 percent. Average annual precipitation is 12 to 15 inches, and mean annual air temperature is 45 to 49 degrees F.

These Bond soils are classified as loamy, mixed, mesic Lithic Ustollic Haplargids.

Typical pedon of a Bond fine sandy loam in an area of Bond-Rizno fine sandy loams, 3 to 15 percent slopes, about 5 miles east of La Sal; 300 feet south and 400 feet west of the northeast corner of sec. 10, T. 29 S., R. 25 E.

A1—0 to 2 inches; brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 3/3) moist; single grain; loose, very friable; common very fine roots; noncalcareous; moderately alkaline (pH 8.0); abrupt smooth boundary.

B1—2 to 6 inches; yellowish red (5YR 4/6) very fine sandy loam, reddish brown (5YR 4/3) moist; moderate thick platy structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots, common fine roots, and few medium and coarse roots; many very fine pores and few fine, medium, and coarse pores; few thin clay films in root channels; noncalcareous; moderately alkaline (pH 8.0); clear smooth boundary.

B21t—6 to 12 inches; yellowish red (5YR 4/6) loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots, common fine and medium roots, and few coarse roots; common very fine and few fine pores; many moderately thick clay films on faces of peds and in root channels; noncalcareous; moderately alkaline (pH 8.0); clear smooth boundary.

B22t—12 to 19 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; common fine roots and few very fine, medium, and coarse roots; common very fine and few fine pores; continuous moderately thick clay films on faces of peds and in root channels; noncalcareous; moderately alkaline (pH 8.0); abrupt irregular boundary.

R—19 inches; sandstone.

Depth to sandstone is 12 to 20 inches. The profile has hue of 5YR or 7.5YR, value of 4 to 6 when dry, and chroma of 4 to 6. The particle size control section is 0 to 10 percent pebbles and 0 to 5 percent cobbles.

The B2t horizon dominantly is loam but ranges to sandy clay loam. It is fine sandy loam or very fine sandy loam in the upper part in some pedons. This horizon is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

Bookcliff Variant

The Bookcliff Variant consists of moderately deep, well drained, moderately slowly permeable soils that formed in eolian deposits overlying residuum derived dominantly from sandstone. These soils are on structural benches and cuestas. Elevation is 7,600 to 8,200 feet. Slopes are 2 to 15 percent. Average annual precipitation is 16 to 20 inches, and mean annual air temperature is 41 to 44 degrees F.

These Bookcliff Variant soils are classified as fine-loamy, mixed Typic Argiborolls.

Typical pedon of a Bookcliff Variant fine sandy loam in an area of Bookcliff Variant-Beje complex, 2 to 15 percent slopes, about 2 miles north and 3 miles west of Pace Lake; 1,200 feet north and 1,900 feet east of the southwest corner of sec. 25, T. 25 S., R. 25 E.

A1—0 to 4 inches; brown (7.5YR 4/2) fine sandy loam, dark reddish brown (5YR 3/2) moist; weak fine platy structure parting to weak fine granular; soft, very friable, slightly plastic; many very fine and fine roots and few medium and coarse roots; few very fine and fine pores; 5 percent channers; mildly alkaline (pH 7.4); abrupt smooth boundary.

A3—4 to 10 inches; dark reddish brown (5YR 3/3) loam, dark reddish brown (5YR 3/2) moist; moderate medium platy structure parting to moderate medium granular; hard, firm, slightly sticky and plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine pores; common thin clay films on faces of peds; 5 percent channers; mildly alkaline (pH 7.6); clear smooth boundary.

B21t—10 to 15 inches; reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; strong medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; common very fine pores, many fine pores, and few medium and coarse pores; many moderately thick clay films on faces of peds; 5 percent channers and 5 percent flagstones; moderately alkaline (pH 8.2); gradual wavy boundary.

B22t—15 to 27 inches; reddish brown (5YR 4/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; few very fine, fine, and medium roots; few very fine and medium pores and common fine pores; continuous thick clay films on faces of peds; 5 percent channers and 5 percent flagstones; moderately alkaline (pH 8.2); clear wavy boundary.

R—27 inches; sandstone.

Depth to bedrock is 20 to 40 inches. The mollic epipedon is 7 to 15 inches thick. The profile has hue of 5YR or 7.5YR. It is mildly alkaline or moderately alkaline.

The A horizon has value of 3 or 4 when dry and chroma of 2 or 3. It is fine sandy loam or loam.

The B2t horizon has value of 3 or 4 when moist and chroma of 3 or 4. It is loam, sandy clay loam, or clay loam.

The Bookcliff Variant soils in this survey area differ from the Bookcliff soils by having bedrock at a depth of 20 to 40 inches.

Broad Canyon Series

The Broad Canyon series consists of very deep, well drained, moderately rapidly permeable soils that formed in colluvium derived dominantly from intrusive igneous rock. These soils are on mountainsides and moraines. Elevation is 8,400 to 11,500 feet. Slopes are 50 to 70 percent. Average annual precipitation is 25 to 35 inches, and mean annual air temperature is 36 to 40 degrees F.

These Broad Canyon soils are classified as loamy-skeletal, mixed Typic Cryoborolls.

Typical pedon of Broad Canyon very cobbly loam, 50 to 70 percent slopes, about 2 miles southeast of Geyser Pass; 1,200 feet north and 600 feet west of the southeast corner of sec. 12, T. 27 S., R. 24 E.

O1—5 inches to 0; partially decomposed leaves and twigs.

A1—0 to 11 inches; brown (10YR 4/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; 20 percent pebbles, 15 percent cobbles, and 5 percent stones; neutral (pH 6.8); clear smooth boundary.

B21—11 to 20 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots, common medium roots, and few coarse roots; 20 percent pebbles, 20 percent cobbles, and 5 percent stones; slightly acid (pH 6.4); gradual wavy boundary.

B22—20 to 30 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable; common very fine and fine roots and few medium roots; 20 percent pebbles, 25 percent cobbles, and 8 percent stones; slightly acid (pH 6.2); gradual wavy boundary.

IIC—30 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly loamy sand, brown (7.5YR 4/4) moist; single grain; loose, slightly sticky; few fine roots; 25 percent pebbles, 40 percent cobbles, and 10 percent stones; slightly acid (pH 6.2).

The mollic epipedon ranges from 10 to 16 inches thick. Thickness of the solum ranges from 20 to 40 inches.

The A horizon has hue of 7.5YR or 10YR. It is stony loam, very stony loam, or very cobbly loam and is 20 to 60 percent rock fragments.

The B2 horizon has hue of 7.5YR or 10YR. It is very cobbly sandy loam, very cobbly loam, or very stony loam. It is 10 to 18 percent clay and 35 to 65 percent rock fragments.

The IIC horizon has hue of 7.5YR or 10YR. It is extremely cobbly or extremely stony loamy sand, sandy loam, or loam. The horizon is 60 to 80 percent rock fragments.

Cahona Series

The Cahona series consists of very deep, well drained, moderately slowly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on cuestas and structural benches. Elevation is 6,200 to 7,200 feet. Slopes are 2 to 8 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 46 to 48 degrees F.

These Cahona soils are classified as fine-silty, mixed, mesic Ustollic Haplargids.

Typical pedon of Cahona fine sandy loam, 2 to 8 percent slopes, about 2.7 miles southeast of La Sal; 2,000 feet south and 1,000 feet east of the northwest corner of sec. 18, T. 29 S., R. 25 E.

A1—0 to 2 inches; yellowish red (5YR 5/6) fine sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; loose, very friable; common fine and very fine roots and few medium and coarse roots; noncalcareous; mildly alkaline (pH 8.0); abrupt smooth boundary.

B1—2 to 6 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to moderate thin platy; slightly hard, friable, sticky and slightly plastic; many very fine and fine roots and few medium and coarse roots; many very fine and fine pores and few medium pores; noncalcareous; mildly alkaline (pH 7.9); clear smooth boundary.

B21t—6 to 15 inches; yellowish red (5YR 4/6) silty clay loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine pores, many fine pores, and few medium pores; common moderately thick clay films on faces of peds; noncalcareous; moderately alkaline (pH 8.0); clear smooth boundary.

B22t—15 to 20 inches; reddish brown (5YR 5/4) silty clay loam, yellowish red (5YR 4/6) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; few fine and very fine roots; common fine and very fine pores; few thin clay films on faces of peds; noncalcareous; moderately alkaline (pH 8.2); gradual smooth boundary.

C1ca—20 to 38 inches; pink (5YR 7/3) loam, light reddish brown (5YR 6/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine pores and common fine and medium pores; strongly calcareous; carbonates are in veins and filaments; strongly alkaline (pH 9.0); clear smooth boundary.

C2ca—38 to 60 inches; pink (5YR 7/4) fine sandy loam, light reddish brown (5YR 6/4) moist; massive; hard, very friable, slightly sticky; few very fine roots; few very fine pores and common fine and medium pores; common cicada casts; strongly calcareous; carbonates are in veins and filaments; strongly alkaline (pH 9.0).

Thickness of the solum ranges from 19 to 30 inches.

The A horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 6. It typically is fine sandy loam but ranges to sandy loam and sandy clay loam. This horizon is mildly alkaline or moderately alkaline. It is 2 to 7 inches thick.

The B2t horizon has hue of 5YR, value of 4 to 6 when dry, and chroma of 3 to 6. It typically is silty clay loam but ranges to silt loam and clay loam. It is 18 to 35 percent clay. Structure is mainly weak or moderate and prismatic but is moderate, strong, and subangular or angular blocky in some pedons. Common thin to moderately thick clay films are on faces of peds. The

B2t horizon is noncalcareous to moderately calcareous and is mildly alkaline or moderately alkaline.

The C horizon has hue of 7.5YR to 2.5YR. It commonly is loam or fine sandy loam but ranges to sandy loam and silty clay loam. This horizon is slightly calcareous to strongly calcareous and is moderately alkaline or strongly alkaline.

Cataract Series

The Cataract series consists of moderately deep, well drained, moderately slowly permeable soils that formed in alluvial deposits derived dominantly from sandstone and shale. These soils are on alluvial fans and benches. Elevation is 4,000 to 5,000 feet. Slopes are 2 to 8 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 52 to 54 degrees F.

These Cataract soils are classified as fine-loamy, mixed, mesic Typic Haplargids.

Typical pedon of Cataract loamy fine sand, 2 to 8 percent slopes, about 3 miles south and 4 miles west of Hurrah Pass; 1,250 feet north and 450 feet west of the southeast corner of sec. 22, T. 27 S., R. 20 E.

A1—0 to 2 inches; red (2.5YR 5/6) loamy fine sand, reddish brown (2.5YR 4/4) moist; weak medium platy structure parting to single grain; soft, very friable, slightly sticky; few fine, medium, and coarse roots; 5 percent pebbles on the surface; moderately calcareous; carbonates are disseminated; mildly alkaline (pH 7.6); abrupt smooth boundary.

B21t—2 to 5 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (2.5YR 4/4) moist; weak medium subangular blocky structure parting to moderate medium granular; soft, very friable, slightly sticky and slightly plastic; common very fine, medium, and coarse roots; few medium pores; few thin clay films as bridges between sand grains and on faces of peds; about 1 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

B22t—5 to 9 inches; reddish brown (2.5YR 4/4) clay loam, reddish brown (2.5YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine granular; hard, firm, very sticky and very plastic; common very fine roots and few fine, medium, and coarse roots; few very fine, fine, and medium pores; many moderately thick clay films on faces of peds; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); clear smooth boundary.

C1ca—9 to 19 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; massive; hard, friable, sticky and plastic; common very fine roots and few fine, medium, and coarse roots; few fine and medium pores; very strongly calcareous; carbonates are disseminated and as seams and common medium concretions; strongly alkaline (pH 8.8); gradual smooth boundary.

C2ca—19 to 25 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 5/4) moist; massive; hard, firm, sticky and plastic; few very fine, fine, and medium roots; common fine and few medium pores; strongly calcareous; carbonates are disseminated and as seams and common medium concretions; mildly alkaline (pH 7.6); gradual smooth boundary.

C3—25 to 33 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 5/4) moist; massive and some rock structure; hard, firm, sticky and plastic; few very fine and fine roots; common fine and few medium pores; strongly calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); clear smooth boundary.

R—33 inches; sandstone.

Thickness of the solum is 7 to 19 inches. Depth to bedrock is 20 to 40 inches. The argillic horizon is 6 to 16 inches thick. Depth to the calcic horizon is 6 to 26 inches.

The A horizon has hue of 2.5YR or 5YR and value of 5 or 6 when dry. It commonly is loamy fine sand but ranges from sandy loam to fine sand. This horizon is slightly calcareous or moderately calcareous and is mildly alkaline to strongly alkaline.

The B2t horizon has hue of 2.5YR or 5YR, value of 3 to 6 when dry and 4 or 5 when moist, and chroma of 4 to 6. It commonly is fine sandy loam, clay loam, or sandy clay loam but ranges to sandy loam and gravelly fine sandy loam. Content of rock fragments is 0 to 15 percent. This horizon is moderately calcareous or strongly calcareous and is moderately alkaline or strongly alkaline.

The Cca horizon has hue of 2.5YR or 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. It is sandy clay loam, loam, clay loam, or fine sandy loam. Content of rock fragments is 0 to 15 percent. This horizon is strongly calcareous or very strongly calcareous and is mildly alkaline to strongly alkaline. A layer of weathered sandstone 6 to 10 inches thick overlies the hard sandstone in some pedons.

Dranyon Series

The Dranyon series consists of deep, well drained, moderately slowly permeable soils that formed in residuum derived dominantly from sandstone. These soils are on cuestas. Elevation is 8,000 to 9,000 feet. Slopes are 8 to 15 percent. Average annual precipitation is 20 to 25 inches, and mean annual air temperature is 38 to 41 degrees F.

These Dranyon soils are classified as fine-loamy, mixed Argic Pachic Cryoborolls.

Typical pedon of a Dranyon sandy loam in an area of Dranyon-Tolman Variant complex, 8 to 20 percent slopes, about 6.5 miles northeast of La Sal; 400 feet north and 2,450 feet west of the southeast corner of sec. 33, T. 27 S., R. 25 E.

O1—1 inch to 0; partially decomposed leaves and twigs.

A1—0 to 13 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; common fine pores; 5 percent pebbles; slightly acid (pH 6.4); gradual wavy boundary.

B1t—13 to 19 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; common fine pores; few thin clay films on faces of peds; 5 percent pebbles and 2 percent cobbles; neutral (pH 6.6); clear wavy boundary.

B21t—19 to 25 inches; pink (7.5YR 7/4) cobbly sandy clay loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, firm, sticky and plastic; common fine roots, many medium roots, and few coarse roots; few fine pores; common thin clay films on faces of peds; 20 percent pebbles and 30 percent cobbles; neutral (pH 7.3); clear wavy boundary.

B22t—25 to 38 inches; very pale brown (10YR 7/3) cobbly clay loam, yellowish brown (10YR 5/4) moist; moderate medium angular blocky structure; slightly hard, firm, sticky and plastic; few fine roots and common medium roots; few fine pores; common moderately thick clay films on faces of peds; 10 percent pebbles and 10 percent cobbles; neutral (pH 7.3); gradual wavy boundary.

C—38 to 52 inches; very pale brown (10YR 7/4) very cobbly clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, firm, sticky and plastic; few fine roots; few fine pores; 30 percent pebbles and 35 percent cobbles; neutral (pH 7.3); abrupt smooth boundary.

R—52 inches; sandstone.

Depth to bedrock ranges from 40 to 60 inches. The mollic epipedon ranges from 16 to 24 inches thick. Depth to the argillic horizon ranges from 9 to 15 inches.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is loam or sandy loam and is 3 to 8 percent pebbles. The A horizon is slightly acid or neutral.

The B2t horizon is cobbly sandy clay loam, stony sandy clay loam, or cobbly loam. It averages 15 to 35 percent rock fragments, including 5 to 15 percent pebbles, 5 to 25 percent cobbles, and 0 to 10 percent stones. The horizon is 25 to 35 percent clay.

Factory Series

The Factory series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone over a calcium carbonate cemented hardpan. These soils are on remnant structural benches and mesas. Elevation is 6,000 to 6,500 feet. Slopes are 2 to 6 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 47 to 49 degrees F.

These Factory soils are classified as coarse-loamy, carbonatic, mesic Ustollic Paleorthids.

Typical pedon of Factory gravelly fine sandy loam, 2 to 6 percent slopes, about 4 miles east of Needles Overlook; 1,900 feet east and 2,100 feet south of the northwest corner of sec. 32, T. 29 S., R. 21 E.

A1—0 to 2 inches; yellowish red (5YR 5/6) gravelly fine sandy loam, reddish brown (5YR 4/4) moist; single grain; very few fine roots; 30 percent very hard, pebble-sized, calcium carbonate cemented hardpan fragments; moderately calcareous; carbonates are disseminated; mildly alkaline (pH 7.8); abrupt smooth boundary.

B21—2 to 7 inches; yellowish red (5YR 5/6) gravelly fine sandy loam, reddish brown (5YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm; few fine and medium roots; few very fine and fine pores; 30 percent hard, pebble-sized, calcium carbonate cemented hardpan fragments; moderately calcareous; carbonates are disseminated;

moderately alkaline (pH 8.2); clear smooth boundary.

B22—7 to 13 inches; yellowish red (5YR 5/6) gravelly fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm; few fine, medium, and coarse roots; few very fine and fine pores; 20 percent pebble-sized, calcium carbonate cemented hardpan fragments; strongly calcareous; carbonates are disseminated and in nodules; moderately alkaline (pH 8.2); clear smooth boundary.

B3—13 to 18 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; hard, firm; few fine roots; common very fine and fine pores; 10 percent hard, pebble-sized, calcium carbonate cemented hardpan fragments; strongly calcareous; nodules of carbonates; strongly alkaline (pH 9.0); clear smooth boundary.

C1ca—18 to 29 inches; pink (5YR 8/4) gravelly fine sandy loam, reddish yellow (5YR 7/6) moist; massive; weakly cemented; hard, firm; few fine roots; few very fine and fine pores; 50 percent hard, pebble-sized, calcium carbonate cemented hardpan fragments; very strongly calcareous; strongly alkaline (pH 9.0); abrupt smooth boundary.

C2cam—29 inches; indurated, calcium carbonate cemented hardpan.

Depth to the hardpan ranges from 20 to 30 inches.

The A1 horizon is gravelly fine sandy loam or fine sandy loam. It is mildly alkaline or moderately alkaline.

The B horizon has value of 5 or 6 when dry. It commonly is gravelly fine sandy loam but ranges to gravelly very fine sandy loam and very fine sandy loam. Structure is mainly moderate, medium, and subangular blocky but in some pedons is weak, medium or moderate, coarse and prismatic parting to moderate, medium, and subangular blocky. The B horizon is moderately calcareous or strongly calcareous and is moderately alkaline or strongly alkaline. Content of pebble-sized, calcium carbonate cemented hardpan fragments ranges from 5 to 27 percent.

The C1ca horizon has value of 7 or 8 when dry and chroma of 2 to 4. It is moderately alkaline to very strongly alkaline.

Falcon Series

The Falcon series consists of shallow, well drained, moderately rapidly permeable soils that formed in residuum derived dominantly from sandstone. These soils are on structural benches, cuestas, hogbacks, and escarpments. Elevation is 7,400 to 8,800 feet. Slopes are 8 to 65 percent. Average annual precipitation is 16 to 22 inches, and mean annual air temperature is 41 to 45 degrees F.

These Falcon soils are classified as loamy, mixed Lithic Haploborolls.

Typical pedon of Falcon fine sandy loam, 8 to 15 percent slopes, about 5 miles north and 7.5 miles east of La Sal; 2,000 feet south and 1,000 feet east of the northeast corner of sec. 12, T. 27 S., R. 25 E.

A1—0 to 7 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable; common fine, medium, and coarse roots; 5 percent pebbles; noncalcareous; carbonates are disseminated; mildly alkaline (pH 7.6); clear smooth boundary.

B2—7 to 17 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable; common fine, medium, and coarse roots; few fine pores; 10 percent pebbles, 5 percent cobbles, and 1 percent stones; mildly alkaline (pH 7.6); abrupt smooth boundary.

R—17 inches; sandstone.

The solum is 7 to 18 inches thick. The mollic epipedon is 7 to 10 inches thick. Depth to sandstone is 10 to 20 inches. The particle size control section is 0 to 35 percent rock fragments. The profile has hue of dominantly 7.5YR to 10YR. Hue of redder than 7.5YR is in some pedons.

The A horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 to 4. It is fine sandy loam or gravelly fine sandy loam. This horizon is neutral or mildly alkaline.

The B horizon has value of 4 to 6 when dry and 3 to 5 when moist, and it has chroma of 2 to 4. It is fine sandy loam, sandy loam, gravelly sandy loam, or cobbly fine sandy loam. This horizon is neutral or mildly alkaline.

The C horizon has value of 5 or 6 when dry and 3 to 5 when moist, and it has chroma of 4 to 6. It is loamy fine sand, very channery loamy sand, or loamy sand.

Flygare Series

The Flygare series consists of very deep, well drained, moderately permeable soils that formed in alluvium and glacial till derived dominantly from intrusive igneous rock. These soils are on

mountainsides and glacial outwash fans. Elevation is 8,700 to 10,000 feet. Slopes are 5 to 50 percent. Average annual precipitation is 25 to 30 inches, and mean annual air temperature is 36 to 45 degrees F.

These Flygare soils are classified as loamy-skeletal, mixed Cryic Pachic Paleborolls.

Typical pedon of Flygare loam, 5 to 25 percent slopes, about 3 miles west of Geyser Pass; 2,400 feet north and 500 feet east of the southwest corner of sec. 4, T. 27 S., R. 24 E.

O1—2 inches to 0; partially decomposed leaves and twigs.

A11—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, slightly plastic; many very fine and fine roots and common medium roots; few very fine pores; 5 percent pebbles; slightly acid (pH 6.5); clear wavy boundary.

A12—10 to 23 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and many coarse roots; few very fine pores; 5 percent pebbles, 3 percent cobbles, and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

A2—23 to 36 inches; light brown (7.5YR 6/4) stony loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots and common fine and medium roots; few very fine pores; 5 percent pebbles, 15 percent cobbles, and 10 percent stones; slightly acid (pH 6.5); clear smooth boundary.

B2t—36 to 46 inches; light reddish brown (5YR 6/4) very stony clay loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine pores; common thin clay films on faces of peds; 15 percent pebbles, 10 percent cobbles, and 15 percent stones; slightly acid (pH 6.5); clear wavy boundary.

C—46 to 60 inches; pink (7.5YR 7/4) very cobbly sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly plastic; few very fine and fine roots; few fine pores; 15 percent pebbles, 20 percent cobbles, and 5 percent stones; slightly acid (pH 6.5).

The mollic epipedon is 20 to 30 inches thick. The thickness of the solum ranges from 44 to 60 inches or more.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 1 or 2. The A1 horizon is loam, sandy loam, or very fine sandy loam. It is 5 to 15 percent pebbles, 0 to 10 percent cobbles, and 0 to 10 percent stones. This horizon is medium acid to neutral.

The A2 horizon is stony loam, cobbly loam, very stony sandy loam, very cobbly sandy loam, very gravelly sandy loam, or cobbly loamy sand. It is 35 to 60 percent rock fragments. This horizon is slightly acid or neutral.

The B2t horizon has hue of 5YR to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 4 to 6. It is very stony clay loam, very cobbly sandy loam, or very cobbly sandy clay loam.

Frolic Series

The Frolic series consists of very deep, moderately well drained, moderately permeable soils that formed in alluvium derived dominantly from mixed sedimentary rock. These soils are on valley bottoms. Elevation is 7,100 to 7,800 feet. Slopes are 2 to 6 percent. Average annual precipitation is 16 to 18 inches, and mean annual air temperature is 43 to 45 degrees F.

These Frolic soils are classified as fine-loamy, mixed Cumulic Haploborolls.

Typical pedon of Frolic loam, 2 to 6 percent slopes, about 2.5 miles west of La Sal; 2,000 feet south and 400 feet east of the northwest corner of sec. 26, T. 28 S., R. 25 E.

Ap—0 to 7 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to weak fine granular; slightly hard, friable, slightly sticky; many very fine, fine, medium, and coarse roots; common very fine and fine pores and few medium and coarse pores; mildly alkaline (pH 7.8); clear smooth boundary.

A12—7 to 14 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky; many very fine and fine roots and common medium roots; many very fine and fine pores and common medium and coarse pores; moderately alkaline (pH 8.0); clear smooth boundary.

A13—14 to 34 inches; dark brown (7.5YR 3/2) loam, very dark brown (7.5YR 2/2) moist; strong moderate prismatic structure parting to moderate medium

subangular blocky; very hard, firm, slightly sticky; common very fine and fine roots and few medium and coarse roots; few very fine and medium pores and common coarse pores; moderately alkaline (pH 8.0); gradual smooth boundary.

C1—34 to 48 inches; dark brown (7.5YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; massive; very hard, very firm, slightly sticky; few very fine, fine, medium, and coarse roots; common very fine, fine, and medium pores and few coarse pores; moderately alkaline (pH 8.0); gradual smooth boundary.

C2—48 to 60 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; massive; very hard, very firm, slightly sticky; few very fine, fine, medium, and coarse roots; few very fine pores, common fine and medium pores, and few coarse pores; moderately alkaline (pH 8.0).

Thickness of the solum is 30 to 34 inches. A water table is at a depth of 3 to 5 feet. The particle size control section averages 18 to 26 percent clay.

The A horizon has value of 3 or 4 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. It is loam, fine sandy loam, or sandy clay loam. This horizon is mildly alkaline or moderately alkaline.

The C horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 2 to 6. It dominantly is fine sandy loam but includes loam and sandy loam.

Fughes Series

The Fughes series consists of very deep, well drained, slowly permeable soils that formed in colluvium derived dominantly from shale and intermediate igneous rock. These soils are in landslide areas and on solifluction lobes. Elevation is 8,200 to 8,400 feet. Slopes are 4 to 10 percent. Average annual precipitation is 18 to 22 inches, and mean annual air temperature is 42 to 44 degrees F.

These Fughes soils are classified as fine, montmorillonitic Pachic Argiborolls.

Typical pedon of Fughes loam, 4 to 10 percent slopes, about 4 miles east of La Sal Pass; 200 feet south and 550 feet west of the northeast corner of sec. 9, T. 28 S., R. 25 E.

A1—0 to 8 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium granular; very hard, very firm, slightly sticky; common very fine, fine, and medium roots; common fine tubular pores; mildly alkaline (pH 7.6); clear smooth boundary.

B1—8 to 21 inches; reddish brown (5YR 5/3) clay loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure; very hard, very firm, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular pores; few thin clay films on faces of peds; 2 percent pebbles; mildly alkaline (pH 7.7); clear smooth boundary.

B21t—21 to 38 inches; reddish brown (5YR 5/4) silty clay loam, brown (7.5YR 5/4) moist; extremely hard, very firm, very sticky and plastic; common medium and coarse roots and few fine roots; common fine tubular pores; common thick clay films on faces of peds; 2 percent pebbles; mildly alkaline (pH 7.7); clear wavy boundary.

IIB22t—38 to 45 inches; yellowish red (5YR 5/6) sandy clay, reddish yellow (7.5YR 6/6) moist; moderate medium subangular blocky structure; extremely hard, extremely firm, very sticky and slightly plastic; very few fine and few medium roots; few fine tubular pores; common moderately thick clay films on faces of peds; 5 percent sandstone channers; mildly alkaline (pH 7.8); gradual smooth boundary.

IIB3t—45 to 60 inches; yellowish red (5YR 5/6) sandy clay, reddish yellow (7.5YR 6/6) moist; moderate medium subangular blocky structure; very hard, very firm, slightly sticky and slightly plastic; very few medium and few coarse roots; few fine tubular pores; common moderately thick clay films on faces of peds; 10 percent sandstone channers; mildly alkaline (pH 7.8).

These soils typically are neutral or mildly alkaline to a depth of more than 60 inches. The mollic epipedon is 20 to 40 inches thick. The solum is 36 to 60 inches thick. The particle size control section is 35 to 50 percent clay and 0 to 10 percent rock fragments.

The A horizon has hue of 5YR to 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is silt loam or loam.

The B horizon has hue of 5YR to 10YR, value of 3 to 5 when dry and 4 to 6 when moist, and chroma of 2 to 6. It is silty clay loam, sandy clay, clay, or clay loam.

The C horizon, where present, is silty clay loam or clay loam.

Hagerman Series

The Hagerman series consists of moderately deep, well drained, moderately permeable soils that formed in

eolian deposits derived dominantly from sandstone. These soils are on structural benches. Elevation is 5,500 to 6.500 feet. Slopes are 2 to 8 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 46 to 48 degrees F.

These Hagerman soils are classified as fine-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of Hagerman very fine sandy loam, 2 to 8 percent slopes, about 6 miles southeast of La Sal; 750 feet north and 1,000 feet east of the southwest corner of sec. 33, T. 29 S., R. 25 E.

A1—0 to 3 inches; brown (7.5YR 4/4) very fine sandy loam, dark brown (7.5YR 4/3) moist; weak medium granular structure parting to single grain; soft, very friable; common very fine and fine roots and few medium roots; moderately alkaline (pH 8.0); abrupt smooth boundary.

B21t—3 to 8 inches; yellowish red (5YR 4/6) very fine sandy loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots, many fine roots, and few medium and coarse roots; many very fine and fine pores and few medium pores; few thin clay films on faces of peds; mildly alkaline (pH 7.8); clear smooth boundary.

B22t—8 to 11 inches; brown (7.5YR 4/4) sandy clay loam, brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine roots and few medium and coarse roots; many very fine pores and common fine and medium pores; common moderately thick clay films on faces of peds; moderately alkaline (pH 8.0); gradual smooth boundary.

B23t—11 to 18 inches; brown (7.5YR 4/4) sandy clay loam, brown (7.5YR 4/4) moist; weak medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores and few medium pores; continuous moderately thick clay films on faces of peds; few cicada casts; moderately alkaline (pH 8.0); clear smooth boundary.

C1ca—18 to 28 inches; brown (7.5YR 5/4) sandy clay loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, sticky and plastic; few very fine, fine, medium, and coarse roots; many very fine and few fine pores; few cicada casts; slightly calcareous; carbonates are in fine veins; strongly alkaline (pH 8.6); clear smooth boundary.

C2—28 to 33 inches; strong brown (7.5YR 5/6) sandy clay loam, brown (7.5YR 5/4) moist; massive; hard, friable, sticky and plastic; few very fine, fine, medium, and coarse roots; common very fine pores; slightly calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

R—33 inches; sandstone.

Depth to sandstone is 20 to 40 inches.

The A horizon has hue of 7.5YR, value of 5 or 6 when dry, and chroma of 4 to 6. This horizon is mildly alkaline or moderately alkaline.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry, and chroma of 4 to 6. This horizon is mildly alkaline or moderately alkaline.

The C horizon has hue, value, and chroma similar to that of the Bt horizon. The C horizon is moderately alkaline or strongly alkaline.

Hangdo Series

The Hangdo series consists of very deep, well drained, moderately slowly permeable soils that formed in alluvium derived dominantly from sandstone, shale, and diorite. These soils are on glacial outwash and alluvial fans. Elevation is 7,200 to 8,300 feet. Slopes are 3 to 25 percent. Average annual precipitation is 15 to 18 inches, and mean annual air temperature is 42 to 43 degrees F.

These Hangdo soils are classified as fine-loamy, mixed Typic Argiborolls.

Typical pedon of Hangdo loam, 3 to 15 percent slopes, about 3.5 miles north and 0.5 mile west of La Sal; 300 feet north and 2,250 feet west of the southeast corner of sec. 15, T. 28 S., R. 24 E.

A1—0 to 11 inches; dark reddish brown (5YR 3/2) loam, very dark gray (5YR 3/1) moist; weak coarse subangular blocky structure parting to moderate medium subangular blocky; soft, very friable, slightly sticky; many very fine and fine roots and few medium roots; many fine pores; 5 percent pebbles; mildly alkaline (pH 7.6); clear smooth boundary.

B21t—11 to 20 inches; reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots, many medium roots, and few coarse roots; many fine and common medium pores; few thin clay films on faces of peds; 5 percent pebbles and 1 percent cobbles; mildly alkaline (pH 7.8); gradual wavy boundary.

B22t—20 to 35 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, slightly sticky and plastic; common fine, medium, and coarse roots; many fine and common medium pores; few thin clay films on faces of peds; 5 percent pebbles, 5 percent cobbles, and 1 percent stones; mildly alkaline (pH 7.8); gradual wavy boundary.

IIB23t—35 to 44 inches; reddish brown (5YR 5/4) cobbly sandy clay loam, reddish brown (5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; many fine and medium pores and few coarse pores; few moderately thick clay films on faces of peds; 10 percent pebbles, 10 percent cobbles, and 3 percent stones; mildly alkaline (pH 7.8); gradual wavy boundary.

IIB3—44 to 63 inches; light reddish brown (5YR 6/4) cobbly sandy clay loam, reddish brown (5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many medium and common coarse pores; some colloid bridging mineral grains; 10 percent pebbles, 10 percent cobbles, and 1 percent stones; rock fragments are highly weathered; moderately alkaline (pH 8.0).

The mollic epipedon is 10 to 16 inches thick. Depth to the argillic horizon is 11 to 15 inches. Thickness of the solum and depth to free carbonates are more than 40 inches. The particle size control section is 20 to 35 percent clay and averages 5 to 15 percent rock fragments. The profile has hue of 5YR to 7.5YR.

The A1 horizon has value of 3 or 4 when dry and 2 or 3 when moist, and it has chroma of 2 or 3 when dry and 1 or 2 when moist. It is 0 to 15 percent pebbles and 0 to 15 percent cobbles.

The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 3 to 6. The upper part commonly is loam, clay loam, sandy clay loam, or cobbly loam and averages 20 to 35 percent clay, and the lower part is very cobbly sandy clay loam, cobbly sandy clay loam, very cobbly clay loam, or very gravelly clay loam and averages 30 to 35 percent clay. The lower part of the B2t horizon is 10 to 40 percent pebbles, 10 to 25 percent cobbles, and 0 to 10 percent stones. This horizon is mildly alkaline or moderately alkaline.

The B3 horizon has value of 5 to 7 when dry and 4 to 6 when moist, and it has chroma of 4 to 6 when dry and 3 or 4 when moist. It is cobbly sandy clay loam, very gravelly loam, or very cobbly loam and averages 20 to 30 percent clay. This horizon commonly is noncalcareous but is slightly calcareous or moderately calcareous in some pedons. It is mildly alkaline or moderately alkaline.

Hanksville Series

The Hanksville series consists of moderately deep, well drained, moderately slowly permeable soils that formed in residuum derived dominantly from shale. These soils are on shoulders and back slopes of hills. Elevation is 4,000 to 5,000 feet. Slopes are 3 to 15 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 52 to 54 degrees F.

These Hanksville soils are classified as fine, mixed (calcareous), mesic Typic Torriorthents.

Typical pedon of a Hanksville clay loam in an area of Bluechief-Hanksville-Leeko complex, 1 to 15 percent slopes, about 3 miles northeast of the Dewey Bridge; 2,450 feet south and 200 feet east of the northwest corner of sec. 35, T. 22 S., R. 24 E.

A1—0 to 2 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; moderate fine granular structure; soft, very friable, sticky and plastic; few very fine and medium roots; slightly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1—2 to 21 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; few very fine, fine, and medium roots; common very fine and fine pores and few medium pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

C2—21 to 37 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; massive; extremely hard, extremely firm, sticky and plastic; moderately alkaline (pH 8.0); abrupt smooth boundary.

Cr—37 inches; fractured shale.

These soils are calcareous throughout. The particle size control section is clay or clay loam and is 35 to 45 percent clay. The content of rock fragments, dominantly fractured shale, varies considerably with depth. The profile has hue of 5Y to 10YR. Depth to bedrock is 20 to 40 inches.

The A horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 3 or 4. It is clay loam or sandy loam.

The C horizon has value of 5 to 7 when dry and 4 to 6 when moist, and it has chroma 1 to 4.

Harpole Series

The Harpole series consists of very deep, well drained, moderately slowly permeable soils that formed in colluvium and alluvium derived dominantly from diorite. These soils are on mountainsides. Elevation is 7,700 to 8,900 feet. Slopes are 25 to 60 percent. Average annual precipitation is 16 to 22 inches, and mean annual air temperature is 41 to 45 degrees F.

These Harpole soils are classified as loamy-skeletal, mixed Typic Argiborolls.

Typical pedon of Harpole very cobbly loam, 25 to 60 percent slopes, about 4 miles north of La Sal; 1,800 feet north and 700 feet west of the southwest corner of sec. 15, T. 28 S., R. 24 E.

A11—0 to 2 inches; brown (10YR 4/3) very cobbly loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to single grain; soft, very friable; common very fine and fine roots; common fine and medium pores; 15 percent pebbles, 20 percent cobbles, and 5 percent stones; mildly alkaline (pH 7.6); abrupt smooth boundary.

A12—2 to 10 inches; brown (7.5YR 4/4) cobbly loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common fine pores; 5 percent pebbles and 15 percent cobbles; mildly alkaline (pH 7.8); clear smooth boundary.

B1—10 to 15 inches; brown (7.5YR 5/4) cobbly sandy loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few medium and common fine roots; few fine pores; 15 percent pebbles and 10 percent cobbles; mildly alkaline (pH 7.8); clear wavy boundary.

B21t—15 to 31 inches; reddish brown (5YR 5/4) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few medium and common fine roots; few fine pores; few moderately thick clay films on faces of peds; 5 percent stones, 15 percent cobbles, and 20 percent pebbles; moderately alkaline (pH 7.8); clear wavy boundary.

B22t—31 to 38 inches; reddish brown (5YR 5/4) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; soft, friable, sticky and slightly plastic; few very fine roots; few thin clay films on faces of peds; 5 percent stones, 20 percent cobbles, and 20 percent pebbles; moderately alkaline (pH 8.0); clear smooth boundary.

C—38 to 60 inches; yellowish red (5YR 5/6) very cobbly loamy sand, reddish brown (5YR 4/4) moist; massive; soft, friable; few fine roots; 10 percent stones, 20 percent cobbles, and 15 percent pebbles; moderately alkaline (pH 8.0).

The mollic epipedon is 10 to 16 inches thick. Thickness of the solum is 20 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It commonly is cobbly loam, very cobbly loam, or very cobbly sandy loam but ranges to very gravelly sandy clay loam or cobbly sandy loam. It is 15 to 25 percent clay. The A horizon is neutral or mildly alkaline.

The B2t horizon has value of 3 or 4 when moist and chroma of 3 to 6. It is very gravelly sandy clay loam or very cobbly sandy clay loam. The B horizon is 35 to 60 percent rock fragments and 20 to 27 percent clay. It is mildly alkaline or moderately alkaline.

The C horizon has hue of 7.5YR or 5YR. It is very cobbly loamy sand or extremely gravelly sandy loam. The C horizon is mildly alkaline or moderately alkaline.

Harpole Variant

The Harpole Variant consists of very deep, well drained, moderately permeable soils that formed in alluvium derived dominantly from diorite. These soils are on glacial outwash fans. Elevation is 7,600 to 8,200 feet. Slopes are 8 to 25 percent. Average annual precipitation is 16 to 18 inches, and mean annual air temperature is 42 to 44 degrees F.

These Harpole Variant soils are classified as loamy-skeletal, mixed Mollic Eutroboralfs.

Typical pedon of a Harpole Variant cobbly loam in an area of Kilfoil Variant-Hangdo-Harpole Variant complex, 3 to 25 percent slopes, about 3.3 miles north and 0.5 mile west of La Sal; 800 feet south and 1,300 feet west of the northeast corner of sec. 22, T. 28 S., R. 24 E.

A11—0 to 5 inches; reddish brown (5YR 4/3) cobbly loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots and common coarse roots; common fine pores; 15 percent pebbles, 10 percent cobbles, and 1 percent stones; mildly alkaline (pH 7.8); clear wavy boundary.

A12—5 to 11 inches; reddish brown (5YR 5/3) very gravelly sandy clay loam, reddish brown (5YR 4/3) moist; weak fine subangular blocky structure parting to moderate fine granular; hard, firm, sticky and plastic; common fine and coarse roots and many medium roots; common fine pores; 35 percent pebbles, 10 percent cobbles, and 1 percent stones; mildly alkaline (pH 7.8); gradual wavy boundary.

B2t—11 to 21 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine and medium roots and few coarse roots; many fine pores; common thin clay films on faces of peds; 35 percent pebbles, 10 percent cobbles, and 1 percent stones; mildly alkaline (pH 7.8); clear smooth boundary.

B3ca—21 to 28 inches; reddish brown (5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; many fine pores; few thin clay films on faces of peds; 45 percent pebbles, 10 percent cobbles, and 1 percent stones; strongly calcareous; carbonates occur as coatings on rock fragements; moderately alkaline (pH 8.0); clear wavy boundary.

Cca—28 to 60 inches; reddish brown (5YR 5/4) extremely gravelly sandy clay loam, reddish brown (5YR 4/4) moist; massive; loose, very friable, slightly sticky; few fine and medium roots; 60 percent pebbles, 15 percent cobbles, and 5 percent stones; strongly calcareous; carbonates occur as coatings on rock fragments; moderately alkaline (pH 8.0).

The solum is 20 to 40 inches thick. The profile has hue of 5YR or 7.5YR.

The A horizon is very cobbly loam, cobbly loam, or very cobbly sandy clay loam and is 10 to 20 percent clay.

The Harpole Variant soils in this survey area have a thinner dark-colored surface layer than do the soils of the Harpole series.

Herd Series

The Herd series consists of very deep, well drained, very slowly permeable soils that formed in glacial till derived dominantly from mixed sedimentary and igneous rock overlying shale. These soils are on mountainsides and remnant ground moraines. Elevation is 8,600 to 10,400 feet. Slopes are 3 to 15 percent. Average annual precipitation is 25 to 30 inches, and mean annual air temperature is 35 to 38 degrees F.

These Herd soils are classified as fine, montmorillonitic Mollic Cryoboralfs.

Typical pedon of a Herd very stony loam in an area of Richens-Herd complex, 3 to 15 percent slopes, about 0.5 mile north and 1 mile west of Warner Lake; 2,400 feet north and 1,500 feet west of the southeast corner of sec. 20, T. 26 S., R. 24 E.

A1—0 to 4 inches; reddish brown (5YR 4/3) very stony loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, firm, slightly sticky and plastic; many very fine and fine roots and few medium and coarse roots; common fine and medium pores; 15 percent pebbles, 10 percent cobbles, and 10 percent stones; neutral (pH 6.8); clear smooth boundary.

B1—4 to 9 inches; reddish brown (5YR 4/3) stony clay loam, dark reddish brown (5YR 3/2) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; common very fine and fine roots and few medium and coarse roots; few fine and medium pores; 15 percent pebbles, 10 percent cobbles, and 10 percent stones; noncalcareous; neutral (pH 6.8); clear wavy boundary.

B21t—9 to 21 inches; reddish brown (5YR 5/4) stony clay loam, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, very firm, sticky and very plastic; common very fine and fine roots and few medium roots; few fine and medium pores; common moderately thick clay films on faces of peds; 15 percent pebbles, 10 percent cobbles, and 10 percent stones; neutral (pH 7.0); abrupt smooth boundary.

IIB22t—21 to 30 inches; light yellowish brown (10YR 6/4) clay, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure parting to strong medium angular blocky; extremely hard, very firm, sticky and very plastic; few fine roots; few fine pores; common moderately thick clay films on faces of peds; some iron and organic stains on faces of peds; few pressure faces; neutral (pH 7.2); clear wavy boundary.

IIB3ca—30 to 44 inches; very pale brown (10YR 7/4) clay, brown (10YR 5/3) moist; massive parting to strong medium angular blocky structure; extremely hard, very firm, sticky and very plastic; few very fine roots; few fine pores; few thin clay films on faces of

peds; many pressure faces; some evidence of slickensides; noncalcareous in matrix and moderately calcareous in veins; carbonates in veins; neutral (pH 7.0); gradual wavy boundary.

C—44 to 60 inches; very pale brown (10YR 7/3) clay, pale brown (10YR 6/3) moist; extremely hard, firm, sticky and plastic; few very fine roots; few pressure faces; 5 percent pebbles; slightly calcareous; carbonates are in filaments; mildly alkaline (pH 7.4).

The upper 6 to 9 inches of the profile, where mixed, has value of less than 4 when moist. Depth to the upper boundary of the IIB2t horizon is 12 to 21 inches. Rock fragment content is 30 to 60 percent above the IIB2t horizon and 0 to 10 percent in and below this layer.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is stony or very stony loam.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry, and chroma of 2 to 4. It is stony or very stony clay loam and is 27 to 40 percent clay.

The IIB2t horizon has hue of 5YR to 10YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 3 or 4. It typically is clay but includes silty clay and silty clay loam. The upper part of the IIB2t horizon is noncalcareous or neutral, and the lower part is slightly calcareous or moderately calcareous and is neutral or mildly alkaline. Pressure faces are common and some slickensides are present in this horizon.

The Herd soils in this survey area are a taxadjunct to the Herd series because they have a layer of secondary carbonates and have yellower colors in the IIB2t horizon than do the soils of the Herd series.

Herm Series

The Herm series consists of very deep, well drained, very slowly permeable soils that formed in colluvium and alluvium derived dominantly from shale and sandstone. These soils are in landslide areas and on mountainsides. Elevation is 7,500 to 9,000 feet. Slopes are 3 to 30 percent. Average annual precipitation is 16 to 25 inches, and mean annual air temperature is 39 to 43 degrees F.

These Herm soils are classified as fine, montmorillonitic Typic Argiborolls.

Typical pedon of a Herm stony loam in an area of Herm-Iles stony loams, 3 to 25 percent slopes, about 4 miles northeast of the La Sal Guard Station; 1,200 feet south and 1,400 feet west of the northeast corner of sec. 7, T. 28 S., R. 26 E.

A11—0 to 4 inches; dark brown (7.5YR 4/4) stony loam, very dark brown (7.5YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; common fine and coarse roots and many medium roots; common fine pores; 5 percent pebbles, 5 percent cobbles, and 8 percent stones; mildly alkaline (pH 7.6); clear smooth boundary.

A12—4 to 10 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; common fine, medium, and coarse roots; common very fine pores; 5 percent pebbles and cobbles; mildly alkaline (pH 7.6); clear smooth boundary.

B21t—10 to 23 inches; brown (7.5YR 4/3) clay, brown (7.5YR 4/4) moist; strong medium angular blocky structure; hard, firm, sticky and plastic; common fine and medium roots and few coarse roots; common very fine pores; common thick clay films on faces of peds; 10 percent pebbles; mildly alkaline (pH 7.7); clear wavy boundary.

B22t—23 to 34 inches; brown (7.5YR 5/3) clay, brown (7.5YR 4/4) moist; strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; few fine, medium, and coarse roots; common very fine and fine pores; continuous thick clay films on faces of peds; 10 percent pebbles; mildly alkaline (pH 7.7); clear wavy boundary.

B23t—34 to 48 inches; light brown (7.5YR 6/3) clay, brown (7.5YR 4/4) moist; strong medium subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots; few fine pores; common thick clay films on faces of peds; 10 percent pebbles; mildly alkaline (pH 7.8); clear smooth boundary.

B3—48 to 60 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; few fine roots; few fine pores; 15 percent pebbles; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.0).

The mollic epipedon is 10 to 16 inches thick. The solum is 40 to 60 inches thick or more. The upper 20 inches of the argillic horizon is 35 to 50 percent clay and 0 to 15 percent rock fragments.

The A horizon has hue of 5YR to 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 to 4. It is stony loam, stony clay loam, loam, or clay loam. This horizon is slightly acid to mildly alkaline.

The B2t horizon has hue of dominantly 5YR to 10YR, but it ranges to 2.5YR in some pedons. It has value of 4 to 6 when dry or moist, and it has chroma of 2 to 6. The horizon commonly is clay or clay loam, but it includes

gravelly clay or cobbly clay. Reaction is slightly acid to mildly alkaline.

Some pedons have a C horizon that is slightly calcareous and is mildly alkaline or moderately alkaline.

Hoskinnini Series

The Hoskinnini series consists of shallow, well drained, moderately permeable soils that formed in eolian deposits and residuum derived dominantly from sandstone and limestone. These soils are on structural benches and cuestas. Elevation is 4,000 to 5,000 feet. Slopes are 0 to 8 percent. Average annual precipitation is 6 to 9 inches, and mean annual air temperature is 52 to 55 degrees F.

These Hoskinnini soils are classified as loamy, mixed, mesic Lithic Haplargids.

Typical pedon of Hoskinnini very gravelly fine sandy loam, 0 to 8 percent slopes, about 2 miles northwest of Needles Overlook; 650 feet north and 700 feet east of the southwest corner of sec. 16, T. 29 S., R. 20 E.

A1—0 to 2 inches; reddish yellow (5YR 6/6) very gravelly fine sandy loam, reddish brown (5YR 4/4) moist; weak fine platy structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; 40 percent pebbles; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); abrupt smooth boundary.

B2t—2 to 7 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (2.5YR 4/4) moist; moderate coarse subangular blocky structure parting to moderate medium platy; hard, firm, sticky and plastic; few very fine, fine, and medium roots; common very fine and fine pores; common moderately thick clay films on faces of peds; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

Cca—7 to 16 inches; reddish brown (2.5YR 5/4) cobbly clay loam, reddish brown (2.5YR 5/4) moist; weak coarse subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine, fine, and medium roots; common very fine and fine pores and few medium pores; strongly calcareous; carbonates are in seams; strongly alkaline (pH 8.8); abrupt smooth boundary.

R—16 inches; sandstone.

Depth to bedrock is 10 to 20 inches. The solum is 10 to 16 inches thick. The profile has hue of 2.5YR or 5YR.

The A horizon has value of 5 or 6 when dry and chroma of 4 to 6.

The Bt horizon has value of 4 or 5 when dry and chroma of 4 to 6. It is sandy clay loam or loam and is 19 to 27 percent clay.

The Cca horizon has value of 4 to 6 when dry and chroma of 4 to 6. It is cobbly clay loam, cobbly loam, or gravelly loam. The horizon is 5 to 35 percent pebbles and 0 to 20 percent cobbles.

Ignacio Series

The Ignacio series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on structural benches and cuestas. Elevation is 5,000 to 6,800 feet. Slopes are 2 to 6 percent. Average annual precipitation is 10 to 14 inches, and mean annual air temperature is 48 to 52 degrees F.

These Ignacio soils are classified as coarse-loamy, mixed, mesic Ustollic Camborthids.

Typical pedon of an Ignacio fine sandy loam in an area of Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes, about 3 miles southwest of La Sal Junction; 2,100 feet north and 1,300 feet east of the southwest corner of sec. 13, T. 29 S., R. 22 E.

A1—0 to 2 inches; yellowish red (5YR 5/6) fine sandy loam, reddish brown (5YR 4/4) moist; single grain; loose, very friable; many very fine and fine roots and common medium roots; noncalcareous; mildly alkaline (pH 7.6); abrupt smooth boundary.

B2—2 to 9 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, friable, slightly sticky; many very fine and fine roots; many very fine pores, common fine pores, and few medium pores; noncalcareous; mildly alkaline (pH 7.6); abrupt smooth boundary.

B3—9 to 19 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky; many very fine and fine roots and few medium roots; many very fine pores, common fine pores, and few medium pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.5); clear smooth boundary.

C—19 to 32 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky; common very fine and few

fine roots; common very fine and fine pores and few medium pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt wavy boundary.

R—32 inches; sandstone.

Depth to sandstone is 20 to 40 inches. The solum is 17 to 27 inches thick. The particle size control section is 0 to 15 percent rock fragments.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 6. It is fine sandy loam or gravelly fine sandy loam. This horizon is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

The B horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 to 5 when moist, and chroma of 4 to 6. It dominantly is fine sandy loam or gravelly fine sandy loam but is gravelly very fine sandy loam in some pedons. This horizon is slightly calcareous or moderately calcareous and is mildly alkaline to strongly alkaline.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 4 to 6. It is fine sandy loam, fine sand, or gravelly fine sandy loam. This horizon is moderately alkaline to very strongly alkaline.

Iles Series

The Iles series consists of very deep, well drained, slowly permeable soils that formed in residuum derived dominantly from shale and sandstone. These soils are on foot slopes and toe slopes. Elevation is 7,500 to 8,200 feet. Slopes are 3 to 25 percent. Average annual precipitation is 16 to 20 inches, and mean annual air temperature is 40 to 43 degrees F.

These Iles soils are classified as fine, montmorillonitic Mollic Eutroboralfs.

Typical pedon of an Iles stony loam in an area of Herm-Iles stony loams, 3 to 25 percent slopes, about 1 mile south of Hop Creek; 1,600 feet south and 1,500 feet west of the northeast corner of sec. 7, T. 28 S., R. 26 E.

A11—0 to 2 inches; dark brown (7.5YR 4/2) stony loam, very dark brown (10YR 2/2) moist; weak medium platy structure; soft, very friable; common very fine and fine roots; many very fine and fine pores, common medium pores, and few coarse pores; 10 percent stones, 10 percent pebbles, and 10 percent cobbles; mildly alkaline (pH 7.6); abrupt smooth boundary.

A12—2 to 7 inches; dark brown (7.5YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to strong medium granular; slightly hard, firm, sticky and plastic; common very fine, fine, and medium roots and few coarse roots; common very fine and fine pores and few medium pores; 5 percent pebbles and 5 percent stones; mildly alkaline (pH 7.6); clear smooth boundary.

B21t—7 to 20 inches; dark brown (10YR 4/3) silty clay, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and fine pores; common thin clay films on faces of peds; mildly alkaline (pH 7.8); clear wavy boundary.

B22t—20 to 32 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; few very fine and fine roots; few very fine and fine pores; common thin clay films on faces of peds; slightly calcareous; carbonates are disseminated; mildly alkaline (pH 7.8); clear wavy boundary.

C1ca—32 to 47 inches; light brownish gray (2.5Y 6/2) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine and fine pores; moderately calcareous; carbonates are in seams and filaments; moderately alkaline (pH 8.0); clear wavy boundary.

C2—47 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine pores; moderately calcareous; carbonates are disseminated and in veins; moderately alkaline (pH 8.0).

The A horizon has hue of 5YR to 10YR, value of 4 or 5 when dry, and chroma of 2 to 4. It commonly is stony loam or very stony clay loam but ranges to loam, very gravelly loam, or cobbly silty clay loam. This horizon is mildly alkaline or moderately alkaline. It is 0 to 1 percent boulders, 0 to 15 percent stones, 5 to 15 percent cobbles, and 5 to 20 percent pebbles.

The B2t horizon has hue of 5YR to 10YR, value of 4 to 6 when dry, and chroma of 2 to 6. It commonly is clay loam but ranges from sandy clay loam to clay. This horizon is mildly alkaline or moderately alkaline. It is 0 to 15 percent pebbles, 0 to 10 percent cobbles, and 0 to 10 percent stones.

The C horizon has hue of 7.5YR to 2.5Y, value of 6 or 7 when dry, and chroma of 2 to 4. It is clay loam, silty clay, sandy clay loam, or gravelly clay. It is less than 5 percent pebbles and cobbles.

Jocity Series

The Jocity series consists of very deep, well drained, moderately slowly permeable soils that formed in alluvium derived dominantly from sedimentary and igneous rock. These soils are on alluvial flood plains and alluvial terraces. Elevation is 4,400 to 4,800 feet. Slopes are 2 to 4 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 52 to 55 degrees F.

These Jocity soils are classified as fine-loamy, mixed (calcareous), mesic Typic Torrifluvents.

Typical pedon of Jocity loam, 2 to 4 percent slopes, about 0.2 mile south of Castle Valley Institute; 1,500 feet south and 2,000 feet east of the northwest corner of sec. 8, T. 25 S., R. 23 E.

Ap—0 to 10 inches; reddish brown (2.5YR 5/4) loam, dark reddish brown (2.5YR 3/4) moist; weak fine subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine and fine roots; few fine and medium random tubular pores and common very fine random tubular pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1—10 to 17 inches; red (2.5YR 5/6) sandy loam, dark red (2.5YR 3/6) moist; fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine tubular pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear wavy boundary.

C2—17 to 29 inches; red (2.5YR 5/6) clay loam, dark red (2.5YR 3/6) moist; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; common very fine, fine, and medium pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.5); clear smooth boundary.

C3—29 to 35 inches; reddish brown (2.5YR 5/4) sandy loam, dark red (2.5YR 3/6) moist; massive; slightly hard, very friable, slightly sticky; few very fine and fine roots; few medium tubular pores and common very fine and fine tubular pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear wavy boundary.

A1b—35 to 49 inches; reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; massive; very hard, friable, sticky and slightly plastic; few very fine and fine roots; common fine and many very fine tubular pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.7); abrupt smooth boundary.

C4—49 to 57 inches; red (2.5YR 5/6) loam, dark red (2.5YR 3/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few medium tubular pores and common very fine and fine tubular pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.7); gradual wavy boundary.

C5—57 to 60 inches; reddish brown (2.5YR 5/4) clay loam, dark red (2.5YR 3/6) moist; massive; very hard, firm, sticky and plastic; few very fine roots; few fine and common very fine tubular pores; moderately calcareous; carbonates are disseminated and in few fine veins; strongly alkaline (pH 8.7).

The profile has hue of 2.5YR or 5YR.

The A horizon has value of 4 or 5 when dry and chroma of 3 to 5.

The C horizon has chroma of 3 to 6. It commonly is very fine sandy loam, loam, silt loam, silty clay loam, or clay loam. This horizon is moderately alkaline or strongly alkaline.

Kilfoil Variant

The Kilfoil Variant consists of very deep, well drained, moderately slowly permeable soils that formed in glacial outwash derived dominantly from diorite. These soils are on glacial outwash fans. Elevation is 7,600 to 8,200 feet. Slopes are 3 to 15 percent. Average annual precipitation is 16 to 18 inches, and mean annual air temperature is 42 to 44 degrees F.

The Kilfoil Variant soils are classified as fine-loamy, mixed Mollic Eutroboralfs.

Typical pedon of a Kilfoil Variant cobbly loam in an area of Kilfoil Variant-Hangdo-Harpole Variant complex, 3 to 25 percent slopes, about 2 miles northeast of La Sal; 1,800 feet north and 900 feet west of the southeast corner of sec. 25, T. 28 S., R. 24 E.

A1—0 to 7 inches; brown (7.5YR 4/4) cobbly loam, dark brown (7.5YR 3/3) moist; weak fine granular structure; slightly hard, friable; common fine and medium roots and few coarse roots; many fine tubular pores; 10 percent pebbles and 10 percent cobbles; mildly alkaline (pH 7.8); clear wavy boundary.

B1—7 to 18 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and common medium roots; many fine tubular pores; 4 percent pebbles; mildly alkaline (pH 7.8); clear smooth boundary.

B21t—18 to 29 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 5/6) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common fine tubular pores; common moderately thick clay films on faces of peds; 5 percent pebbles and 5 percent cobbles; moderately alkaline (pH 8.0); gradual smooth boundary.

B22tca—29 to 46 inches; reddish brown (5YR 5/4) cobbly clay loam, reddish brown (5YR 5/4) moist; strong fine and medium subangular blocky structure; hard, very firm, sticky and plastic; few fine and medium roots; common fine tubular pores; 10 percent pebbles and 10 percent cobbles; slightly calcareous; carbonates are in medium soft masses and threads; moderately alkaline (pH 8.2); clear smooth boundary.

C—46 to 60 inches; pink (5YR 8/3) cobbly loam, pink (5YR 7/3) moist; massive; hard, firm, slightly sticky; very few fine and medium roots; few fine tubular pores; 15 percent pebbles and 15 percent cobbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4).

The solum is 29 to 60 inches thick. It generally is noncalcareous but is slightly calcareous or moderately calcareous in the lower part in some pedons.

The A1 horizon has hue of 5YR or 7.5YR, value of 3 to 6 when dry and 3 or 4 when moist, and chroma of 1 to 4. It is cobbly loam, loam, or fine sandy loam. The horizon is 0 to 25 percent rock fragments.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is clay loam or cobbly clay loam. The upper 20 inches of the horizon is 5 to 15 percent rock fragments and 20 to 35 percent clay. The B2t horizon is neutral to moderately alkaline.

Leanto Series

The Leanto series consists of shallow, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on structural benches and cuestas. Elevation is 5,000 to 6,800 feet. Slopes are 2 to 6 percent. Average annual precipitation is 9 to 14 inches, and mean annual air temperature is 48 to 52 degrees F.

These Leanto soils are classified as loamy, mixed, mesic Lithic Camborthids.

Typical pedon of a Leanto fine sandy loam in an area of Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes, about 3 miles southwest of La Sal Junction; 1,000 feet north and 20 feet east of the southwest corner of sec. 12, T. 29 S., R. 22 E.

A1—0 to 1 inch; yellowish red (5YR 5/6) fine sandy loam, reddish brown (5YR 4/4) moist; single grain; loose; many very fine and fine roots and few medium roots; mildly alkaline (pH 7.6); abrupt smooth boundary.

B21—1 to 8 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky; many very fine and fine roots; many very fine and common fine pores; mildly alkaline (pH 7.6); abrupt smooth boundary.

B22—8 to 15 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky; many very fine roots, common fine roots, and few medium roots; common fine and very fine pores and few medium pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

R—15 inches; sandstone.

Thickness of the solum and depth to bedrock are 10 to 20 inches. Depth to free carbonates ranges from 0 to 9 inches. The particle size control section is 12 to 18 percent clay and 0 to 5 percent pebbles. The mean annual soil temperature is 51 to 55 degrees F. The soils are dry in the moisture control section 50 to 60 percent of the time that the soil temperature is above 41 degrees F.

The A1 horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 5 when moist, and chroma of 4 to 6 when dry and 4 when moist. It is noncalcareous to moderately calcareous.

The B2 horizon has hue of 5YR or 7.5YR. It is noncalcareous to moderately calcareous in the upper part and is moderately calcareous in the lower part. Calcium carbonate equivalent is less than 15 percent. The B2 horizon is mildly alkaline or moderately alkaline.

Some pedons have a layer of soft, fractured sandstone above the bedrock.

Leeko Series

The Leeko series consists of very deep, well drained, moderately permeable soils that formed in alluvium derived dominantly from sandstone and shale. These soils are on alluvial terraces. Elevation is 4,000 to 5,000 feet. Slopes are 1 to 3 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 52 to 54 degrees F.

These Leeko soils are classified as fine-loamy, mixed, mesic Typic Natrargids.

Typical pedon of a Leeko loamy fine sand in an area of Bluechief-Hanksville-Leeko complex, 1 to 15 percent slopes, about 0.5 mile north of Hotel Mesa, in the Dolores Triangle; 1,950 feet south and 600 feet east of the northwest corner of sec. 35, T. 22 S., R. 24 E.

A1—0 to 2 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; weak medium granular structure; soft, very friable; few very fine and fine roots; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

B21t—2 to 8 inches; yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine pores and few fine and medium pores; few thin clay films on faces of peds; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); clear smooth boundary.

B22t—8 to 14 inches; reddish yellow (5YR 6/6) loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine and fine roots and few medium roots; common very fine and fine pores and few medium pores; few thin clay films on faces of peds; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 9.0); clear smooth boundary.

C1ca—14 to 28 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine and common fine roots; few very fine and fine pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); clear smooth boundary.

IIC2ca—28 to 51 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; very hard, very firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few fine pores; moderately calcareous; carbonates are in veins and filaments; strongly alkaline (pH 8.6); clear wavy boundary.

IIIC3—51 to 60 inches; strong brown (7.5YR 5/6) loamy sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable; few very fine, fine, and medium roots; slightly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6).

The A horizon has hue of 5YR or 7.5YR and chroma of 4 to 6.

The B horizon has hue of 7.5YR or 5YR, value of 5 or 6 when dry, and chroma of 4 to 6. It commonly is loam, sandy loam, or sandy clay loam. This horizon is strongly alkaline or very strongly alkaline.

The C horizon has hue of 2.5YR to 7.5YR, value of 5 to 7 when dry, and chroma of 4 to 6. It commonly is sandy loam or sandy clay loam. This horizon is strongly alkaline or very strongly alkaline.

Leighcan Series

The Leighcan series consists of very deep, well drained, moderately rapidly permeable soils that formed in colluvium and glacial till derived dominantly from porphyritic diorite. These soils are on mountainsides and valley trains. Elevation is 9,400 to 12,000 feet. Slopes are 25 to 70 percent. Average annual precipitation is 30 to 40 inches, and mean annual air temperature is 32 to 38 degrees F.

These Leighcan soils are classified as loamy-skeletal, mixed Dystric Cryochrepts.

Typical pedon of Leighcan cobbly loam, 50 to 70 percent slopes, about 1 mile west of Mount Waas, 2,600 feet south and 1,600 feet east of the northwest corner of sec. 14, T. 26 S., R. 24 E.

O2—1 inch to 0; moss and undecomposed needles.

A1—0 to 8 inches; brown (10YR 4/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate coarse granular structure; loose, very friable; common fine, medium, and coarse roots; 20 percent pebbles and 10 percent cobbles; medium acid (pH 6.0); clear smooth boundary.

A2—8 to 16 inches; light yellowish brown (10YR 6/4) gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; loose, very friable; few fine and coarse roots and common medium roots; few fine pores; 25 percent pebbles and 5 percent cobbles; medium acid (pH 6.0); gradual smooth boundary.

B21—16 to 37 inches; yellowish brown (10YR 5/6) very gravelly coarse sandy loam, dark yellowish brown (10YR 3/6) moist; weak fine subangular blocky structure parting to weak fine granular; loose; few fine and coarse roots and common medium roots; few fine and common medium pores; 30 percent pebbles and 10 percent cobbles; medium acid (pH 6.0); gradual smooth boundary.

B22—37 to 60 inches; yellowish brown (10YR 5/6) very cobbly coarse sandy loam, dark yellowish brown (10YR 3/6) moist; weak fine subangular blocky structure; loose; very few fine and medium roots; few fine and common medium pores; 25 percent pebbles and 30 percent cobbles; noncalcareous; medium acid (pH 6.0).

The particle size control section averages 35 to 60 percent rock fragments and 8 to 18 percent clay.

The A2 horizon has hue of 5YR to 10YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. It is gravelly sandy loam or very gravelly sandy loam.

The B2 horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 3 to 6. Very gravelly loamy coarse sand is present in some pedons.

Meredith Series

The Meredith series consists of very deep, well drained, moderately rapidly permeable soils that formed in colluvium derived dominantly from porphyritic diorite. These soils are on mountainsides. Elevation is 10,500 to 12,700 feet. Slopes are 20 to 70 percent. Average annual precipitation is 30 to 35 inches, and mean annual air temperature is 26 to 28 degrees F.

These Meredith soils are classified as loamy-skeletal over fragmental, mixed Pergelic Cryumbrepts.

Typical pedon of Meredith stony loam, 20 to 70 percent slopes, about 1 mile south of Mount Mellenthin, in the Dark Canyon cirque basin; 300 feet south and 500 feet west of the northeast corner of sec. 23, T. 27 S., R. 24 E.

O—1 inch to 0; decomposed roots, twigs, and litter.

A1—0 to 7 inches; brown (7.5YR 4/4) stony loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly plastic; many very fine and fine roots and few medium roots; common fine pores; 10 percent stones, 5 percent cobbles, and 10 percent pebbles; common rodent burrows; medium acid (pH 6.0); clear smooth boundary.

B2—7 to 13 inches; brown (7.5YR 5/4) very cobbly loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; many fine and common medium pores; 15 percent pebbles, 20 percent cobbles, and 4 percent stones; medium acid (pH 6.0); abrupt smooth boundary.

C1—13 to 21 inches; light brown (7.5YR 6/4) extremely cobbly sandy clay loam, brown (7.5YR 4/4) moist; single grain; soft, loose, slightly plastic; few very fine and common fine roots; 35 percent pebbles, 30 percent cobbles, and 5 percent stones; medium acid (pH 6.0); gradual wavy boundary.

C2—21 to 60 inches; fragmental material; 45 percent pebbles, 35 percent cobbles, and 15 percent stones.

Thickness of the solum is 13 to 37 inches. Depth to the C2 horizon is 20 to 40 inches.

The A horizon has chroma of 3 or 4. It is stony loam or very gravelly loam.

The B horizon has value of 4 or 5 when dry and chroma of 3 or 4. It is very cobbly loam or extremely cobbly sandy clay loam. The horizon is 35 to 60 percent rock fragments.

The C horizon has value of 5 or 6 when dry and 3 or 4 when moist. It is more than 75 percent rock fragments and has little or no soil material in the interstices.

Mido Series

The Mido series consists of very deep, well drained, rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on sand drifts and sand shadows. Elevation is 5,500 to 6,500 feet. Slopes are 2 to 35 percent. Average annual precipitation is 9 to 14 inches, and mean annual air temperature is 48 to 51 degrees F.

These Mido soils are classified as mixed, mesic Ustic Torripsamments.

Typical pedon of Mido loamy fine sand, 2 to 8 percent slopes, about 1.5 miles east of Rone Bailey Mesa; 2,300 feet south and 1,300 feet east of the northwest corner of sec. 20, T. 30 S., R. 23 E.

A1—0 to 3 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; single grain; loose, very friable; common fine and very fine roots; mildly alkaline (pH 7.8); abrupt smooth boundary.

C1—3 to 15 inches; yellowish red (5YR 5/6) loamy fine

sand, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; soft, very friable; common fine and very fine roots; common very fine, fine, and medium pores; moderately alkaline (pH 8.0); gradual smooth boundary.

C2—15 to 27 inches; light reddish brown (5YR 6/4) loamy fine sand, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; soft, very friable; many very fine and fine roots; few very fine and fine pores and common medium pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); gradual smooth boundary.

C3—27 to 46 inches; light reddish brown (5YR 6/4) fine sand, yellowish red (5YR 5/6) moist; weak medium subangular blocky structure; soft, very friable; few fine and very fine roots; few very fine and fine pores and common medium pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); gradual smooth boundary.

C4—46 to 70 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; soft, very friable; common very fine and fine roots; few very fine and fine pores; many cicada casts; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); gradual smooth boundary.

C5—70 to 84 inches; reddish yellow (5YR 6/6) fine sand, strong brown (7.5YR 5/6) moist; single grain; loose; few very fine roots; common cicada casts; slightly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6).

The A horizon has hue of 7.5YR or 5YR, value of 5 or 6 when dry, and chroma of 3 to 6. It typically is loamy fine sand but ranges to fine sand. The A horizon is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

The C horizon has hue of 7.5YR or 5YR, value of 5 to 8 when dry, and chroma of 3 to 8. It typically is loamy fine sand, fine sand, or sand. The C horizon is slightly calcareous or moderately calcareous and is moderately alkaline or strongly alkaline.

Mivida Series

The Mivida series consists of deep, well drained, moderately rapidly permeable soils that formed in eolian sediment derived dominantly from sandstone. These soils are on structural benches and cuestas. Elevation is 5,000 to 6,400 feet. Slopes are 1 to 8 percent. Average annual precipitation is 9 to 12 inches, and mean annual air temperature is 49 to 53 degrees F.

These Mivida soils are classified as coarse-loamy, mixed, mesic Ustollic Calciorthids.

Typical pedon of Mivida fine sandy loam, 2 to 8 percent slopes, about 2.7 miles east-southeast of Hatch Rock; 100 feet north and 1,200 feet east of the southwest corner of sec. 33, T. 29 S., R. 23 E.

A1—0 to 4 inches; yellowish red (5YR 5/6) fine sandy loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky; few fine and medium roots; few very fine pores; slightly calcareous; carbonates are disseminated; mildly alkaline (pH 7.8); abrupt smooth boundary.

B2—4 to 10 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; soft, very friable, slightly sticky; few fine and medium roots; common fine and few medium pores; slightly calcareous; carbonates are disseminated; mildly alkaline (pH 7.8); clear smooth boundary.

B3ca—10 to 15 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, very friable, slightly sticky; few very fine and fine roots; common very fine and fine pores; moderately calcareous; carbonates are disseminated; common cicada casts; moderately alkaline (pH 8.4); clear smooth boundary.

IIC1ca—15 to 23 inches; pink (5YR 7/3) fine sandy loam, reddish yellow (5YR 6/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine pores; strongly calcareous; carbonates are disseminated and in nodules and seams; common cicada casts; moderately alkaline (pH 8.2); clear smooth boundary.

IIC2ca—23 to 29 inches; pink (5YR 7/4) fine sandy loam, reddish yellow (5YR 6/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine pores; strongly calcareous; carbonates in nodules and seams; common cicada casts; moderately alkaline (pH 8.2); gradual smooth boundary.

IIC3—29 to 43 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive; hard, friable; few very fine and fine roots; common fine pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); clear smooth boundary.

R—43 inches; fractured sandstone.

Thickness of the solum and depth to the calcic horizon range from 13 to 30 inches. The particle size control section is 12 to 18 percent clay and 0 to 15 percent pebbles. Depth to bedrock is 40 to 60 inches.

The A horizon has hue of 5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is very fine sandy loam or fine sandy loam. This horizon is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

The B2 horizon has hue of 5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4 to 6. It is very fine sandy loam or fine sandy loam. This horizon is slightly calcareous or moderately calcareous and is mildly alkaline to strongly alkaline.

The Cca horizon has hue of 5YR, value of 6 to 8 when dry and 4 to 7 when moist, and chroma of 3 to 6. It commonly is fine sandy loam or very fine sandy loam but is loamy fine sand or loamy sand in some pedons. It is 15 to 35 percent sand that is fine or coarser. The calcium carbonate equivalent ranges from 15 to 40 percent. This horizon is moderately alkaline or strongly alkaline.

Moab Series

The Moab series consists of very deep, well drained, moderately rapidly permeable soils that formed in alluvium derived dominantly from sandstone, shale, and igneous rock. These soils are on alluvial fans, valley floors, and valley terraces. Elevation is 4,400 to 6,000 feet. Slopes are 2 to 60 percent. Average annual precipitation is 9 to 12 inches, and mean annual air temperature is 49 to 53 degrees F.

These Moab soils are classified as loamy-skeletal, mixed, mesic Ustollic Calciorthids.

Typical pedon of a Moab gravelly fine sandy loam in an area of Moab-Rizno gravelly fine sandy loams, 2 to 15 percent slopes, about 5 miles east of Cisco; 1,400 feet north and 500 feet east of the southwest corner of sec. 24, T. 21 S., R. 24 E.

A1—0 to 3 inches; brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, loose; many very fine roots, common fine roots, and few medium and coarse roots; 15 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

B2—3 to 10 inches; brown (7.5YR 5/4) gravelly fine sandy loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; soft, very friable; common very fine and fine roots and few medium and coarse roots; common fine and few medium pores; 20 percent pebbles and 5 percent cobbles; moderately calcareous; carbonates are disseminated and in thin pendents on the underside of rock fragments; strongly alkaline (pH 9.0); gradual wavy boundary.

C1ca—10 to 29 inches; pinkish white (7.5YR 8/2) very gravelly fine sandy loam, pinkish gray (7.5YR 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine pores; 50 percent pebbles and 10 percent cobbles; strongly calcareous; carbonates are in common soft masses and thick pendents on the underside of rock fragments; strongly alkaline (pH 8.8); clear wavy boundary.

C2ca—29 to 60 inches; pink (7.5YR 7/4) very gravelly fine sandy loam, light brown (7.5YR 6/4) moist; single grain; loose, slightly sticky; few very fine roots; 40 percent pebbles and 15 percent cobbles; strongly calcareous; carbonates are in few soft masses and thin coatings on the underside of rock fragments; strongly alkaline (pH 8.6).

Thickness of the solum is 6 to 12 inches. The particle size control section is 35 to 65 percent rock fragments and 11 to 18 percent clay. The profile has hue of 5YR or 7.5YR.

The A horizon has chroma of 4 or 6 when dry. It is gravelly fine sandy loam or very cobbly fine sandy loam. The A horizon is 10 to 35 percent pebbles, 0 to 20 percent cobbles, and 0 to 10 percent stones. This horizon is moderately alkaline or strongly alkaline and is slightly calcareous or moderately calcareous.

The B horizon has value of 4 or 5 when moist and chroma of 4 or 6. It commonly is gravelly fine sandy loam, cobbly fine sandy loam, very cobbly fine sandy loam, or fine sandy loam. The B horizon is 5 to 20 percent pebbles, 0 to 25 percent cobbles, and 0 to 5 percent stones. This horizon is moderately alkaline or strongly alkaline.

The Cca horizon has value of 6 to 8 when dry and 4 to 7 when moist, and it has chroma of 2 to 4 when dry or moist. It is very gravelly fine sandy loam or very cobbly fine sandy loam. The C horizon is 10 to 35 percent pebbles, 0 to 30 percent cobbles, and 0 to 10 percent stones. This horizon is moderately alkaline or strongly alkaline.

Moenkopie Series

The Moenkopie series consists of shallow, well drained, moderately rapidly permeable soils that formed in residuum derived dominantly from sandstone. These soils are on benches and cuestas. Elevation is 4,000 to 5,600 feet. Slopes are 1 to 30 percent. Average annual precipitation is 6 to 9 inches, and mean annual air temperature is 52 to 55 degrees F.

These Moenkopie soils are classified as loamy, mixed (calcareous), mesic Lithic Torriorthents.

Typical pedon of a Moenkopie gravelly loamy sand in an area of Moenkopie-Rock outcrop complex, 1 to 15 percent slopes, about 1.1 miles southeast of Hurrah Pass: 1,800 feet south and 2,000 feet east of the northwest corner of sec. 9, T. 27 S., R. 21 E.

A1—0 to 3 inches; reddish brown (5YR 4/4) gravelly loamy sand, reddish brown (2.5YR 4/4) moist; single grain; soft; few fine, medium, and coarse roots; 20 percent pebbles; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

C—3 to 8 inches; reddish brown (2.5YR 4/4) sandy loam, reddish brown (2.5YR 4/4) moist; massive; soft; mildly calcareous; carbonates are disseminated; strongly alkaline (pH 8.8).

R—8 inches; sandstone.

Depth to bedrock is 3 to 20 inches.

The A horizon has hue of 2.5YR or 5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. The horizon is 15 to 25 percent pebbles and 0 to 5 percent cobbles. It is slightly calcareous or moderately calcareous and is mildly alkaline to strongly alkaline.

The C horizon has hue of 2.5YR or 5YR, value of 3 to 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. The horizon is sandy loam or fine sandy loam. It is 0 to 25 percent pebbles and 0 to 5 percent channers. This horizon is slightly calcareous or moderately calcareous and is mildly alkaline to strongly alkaline.

Nakai Series

The Nakai series consists of very deep, well drained, moderately rapidly permeable soils that formed in alluvial and eolian material derived dominantly from sandstone. These soils are on alluvial fans, alluvial terraces, structural benches, and mesas. Elevation is 4,000 to 4,900 feet. Slopes are 0 to 8 percent. Average annual precipitation is 7 to 10 inches, and mean annual air temperature is 52 to 54 degrees F.

These Nakai soils are classified as coarse-loamy, mixed, mesic Typic Calciorthids.

Typical pedon of Nakai fine sand, 2 to 8 percent slopes, about 3 miles north of North Sixshooter Peak, 350 feet north and 100 feet east of the southwest corner of sec. 7, T. 30 S., R. 20 E.

A1—0 to 3 inches; yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6) moist; single grain; loose; few very fine roots; mildly alkaline (pH 7.8); abrupt smooth boundary.

C1—3 to 17 inches; yellowish red (5YR 4/6) fine sand, yellowish red (5YR 4/6) moist; single grain; loose; common very fine and fine roots; few very fine pores; moderately calcareous; carbonates are disseminated; mildly alkaline (pH 7.8); clear smooth boundary.

IIC2—17 to 27 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; soft, friable, slightly sticky; common very fine roots; common very fine and fine pores; 5 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

IIC3ca—27 to 35 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; hard, firm; few very fine roots; common very fine and fine pores; strongly calcareous; carbonates occur as nodules and soft masses; strongly alkaline (pH 8.8); clear irregular boundary.

IIC4ca—35 to 42 inches; reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; massive; hard, firm, slightly sticky; few very fine roots; few very fine pores; strongly calcareous; carbonates occur as nodules and soft masses; moderately alkaline (pH 8.4); clear smooth boundary.

IIC5—42 to 60 inches; reddish yellow (5YR 6/6) fine sandy loam, red (2.5YR 5/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine pores; strongly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4).

Depth to the calcic horizon is 20 to 40 inches. The profile is calcareous throughout except for a thin noncalcareous A horizon in some pedons. The particle size control section is 6 to 17 percent clay.

The A horizon has value of 5 or 6 when dry and chroma of 4 to 6. It is fine sand, loamy fine sand, or fine sandy loam.

The Cca horizon has hue of 2.5YR or 5YR, value of

5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 6. It dominantly is fine sandy loam but is very gravelly fine sandy loam, loamy fine sand, or gravelly fine sandy loam in the lower part in some pedons.

Namon Series

The Namon series consists of very deep, well drained, moderately permeable soils that formed in colluvium and glacial till derived dominantly from diorite. These soils are on ground moraines and lateral moraines. Elevation is 9,600 to 11,000 feet. Slopes are 8 to 50 percent. Average annual precipitation is 30 to 40 inches, and mean annual air temperature is 32 to 37 degrees F.

These Namon soils are classified as loamy-skeletal, mixed Mollic Cryoboralfs.

Typical pedon of Namon gravelly loam, 30 to 50 percent slopes, about 1 mile north of Mount Mellenthin; 700 feet north and 2,280 feet east of the southwest corner of sec. 1, T. 26 S., R. 24 E.

A1—0 to 8 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots and common medium and coarse roots; 10 percent pebbles; slightly acid (pH 6.2); gradual wavy boundary.

A2—8 to 14 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 4/3) moist; moderate medium granular structure; slightly hard, very friable, sticky and slightly plastic; few very fine and fine roots and common medium and coarse roots; 10 percent pebbles; slightly acid (pH 6.4); gradual wavy boundary.

B1t—14 to 25 inches; pink (5YR 7/3) gravelly loam, reddish brown (5YR 5/3) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable, sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few fine and medium pores; few thin clay films on faces of peds; 15 percent pebbles and 10 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.

B2t—25 to 60 inches; light reddish brown (5YR 6/4) very cobbly loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots and common medium and coarse roots; few fine and medium pores; common moderately thick clay films on faces of peds; 25 percent pebbles, 20 percent cobbles, and 5 percent stones; slightly acid (pH 6.4).

Thickness of the solum is 40 to 60 inches. These soils are slightly acid or neutral.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry or moist, and chroma of 3 or 4.

The A2 horizon has hue of 5YR to 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. The A2 horizon is 5 to 7 inches thick.

The B2t horizon has hue of 5YR or 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 3 or 4. It is gravelly loam to very cobbly loam or gravelly sandy loam to very cobbly sandy loam. Rock fragment content ranges from 25 to 65 percent but averages more than 35 percent.

Nepalto Series

The Nepalto series consists of very deep, well drained, rapidly permeable soils that formed in alluvium derived dominantly from sandstone. These soils are on canyon floors and foot slopes of talus cones. Elevation is 4,000 to 4,600 feet. Slopes are 2 to 8 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 53 to 55 degrees F.

These Nepalto soils are classified as sandy-skeletal, mixed, mesic Typic Torriorthents.

Typical pedon of Nepalto gravelly sandy loam, 2 to 8 percent slopes, about 3.5 miles north and 1.5 miles west of Hatch Point Campground; 2,500 feet north and 2,630 feet east of the southwest corner of sec. 29, T. 27 S., R. 21 E.

A1—0 to 5 inches; yellowish red (5YR 5/6) gravelly sandy loam, yellowish red (5YR 5/6) moist; moderate medium platy structure parting to moderate thin platy; slightly hard, very friable, slightly sticky; few very fine and fine roots; many very fine and fine pores and few medium pores; 20 percent pebbles, 5 percent cobbles, 5 percent stones, and 5 percent boulders; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1—5 to 12 inches; yellowish red (5YR 5/8) extremely stony loamy fine sand, yellowish red (5YR 4/6) moist; moderate coarse angular blocky structure; hard, very friable; few very fine, fine, and medium roots; few very fine pores and common fine and medium pores; 10 percent pebbles, 20 percent cobbles, and 30 percent stones; moderately

calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); gradual wavy boundary.

C2—12 to 31 inches; yellowish red (5YR 5/6) extremely cobbly fine sand, yellowish red (5YR 5/6) moist; massive; hard, very friable; few very fine and fine roots; few very fine and fine pores; 20 percent pebbles, 20 percent cobbles, 15 percent stones, and 5 percent boulders; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); gradual wavy boundary.

C3—31 to 70 inches; yellowish red (5YR 5/6) extremely gravelly fine sand, yellowish red (5YR 4/6) moist; single grain; loose; few very fine and fine roots; 65 percent pebbles and 5 percent cobbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.0).

The profile has hue of 2.5YR or 5YR throughout.

The A horizon has value of 4 or 5 when dry and chroma of 4 to 6. It is gravelly sandy loam or very stony sandy loam. This horizon is mildly alkaline or moderately alkaline.

The C horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 4 to 6. It is stony to extremely stony loamy fine sand or loamy sand, extremely gravelly or extremely cobbly fine sand, or gravelly or stony fine sandy loam. This horizon is moderately alkaline or strongly alkaline.

Newsrock Series

The Newsrock series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in sandy eolian deposits derived dominantly from sandstone. These soils are on structural benches. Elevation is 5,200 to 5,600 feet. Slopes are 1 to 3 percent. Average annual precipitation is 9 to 12 inches, and mean annual air temperature is 50 to 52 degrees F.

These Newsrock soils are classified as sandy, mixed, mesic Ustollic Haplargids.

Typical pedon of Newsrock loamy fine sand, 1 to 3 percent slopes, about 1 mile southeast of Anticline Overlook; 2,100 feet north and 1,800 feet east of the southwest corner of sec. 16, T. 27 S., R. 21 E.

A1—0 to 4 inches; yellowish red (5YR 4/6) loamy fine sand, reddish brown (5YR 4/4) moist; single grain; loose; many very fine roots and few fine and medium roots; mildly alkaline (pH 7.8); abrupt smooth boundary.

B21t—4 to 10 inches; reddish brown (2.5YR 4/4) loamy fine sand, reddish brown (2.5YR 4/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine, fine, and medium pores; few thin clay films on faces of peds; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); clear smooth boundary.

B22t—10 to 17 inches; reddish brown (5YR 5/4) loamy fine sand, reddish brown (2.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine, fine, and medium pores; clay bridges between sand grains; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); clear smooth boundary.

B3—17 to 31 inches; yellowish red (5YR 5/6) fine sandy loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; common very fine, fine, and medium pores; moderately calcareous; nodules of carbonates; common cicada casts; strongly alkaline (pH 8.6); clear smooth boundary.

IIC1ca—31 to 46 inches; pink (5YR 8/4) sandy clay loam, pink (5YR 7/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine pores and common medium pores; very strongly calcareous; carbonates are disseminated and in seams; many cicada casts; strongly alkaline (pH 8.8); clear smooth boundary.

IIIC2—46 to 69 inches; pink (5YR 8/4) loamy sand, light reddish brown (5YR 6/4) moist; rock structure; extremely hard, extremely firm; common very fine and fine pores; strongly calcareous; carbonates are mainly as coatings on rock; moderately alkaline (pH 8.4).

Thickness of the solum and depth to the calcic horizon range from 23 to 31 inches. Depth to free carbonates ranges from 2 to 8 inches. Depth to bedrock commonly is more than 60 inches but is 40 to 60 inches in some pedons. Calcium carbonate equivalent ranges from 5 to 10 percent in the solum and from 15 to 60 percent in the Cca horizon.

The A1 horizon has value of 4 or 5 when dry and chroma of 4 to 6. It commonly is loamy fine sand but is fine sandy loam in some pedons. This horizon is mildly

alkaline or moderately alkaline.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5 when dry or moist, and chroma of 4 to 6. It ranges from 7 to 12 percent clay. This horizon is noncalcareous or slightly calcareous in the upper part and is slightly calcareous or moderately calcareous in the lower part. It is mildly alkaline or moderately alkaline.

The IICca horizon has value of 6 to 8 when dry and 5 to 7 when moist, and it has chroma of 4 to 6. It is fine sandy loam, very fine sandy loam, or sandy clay loam. This horizon is moderately alkaline or strongly alkaline.

Redbank Series

The Redbank series consists of very deep, well drained, moderately rapidly permeable soils that formed in alluvium derived dominantly from sandstone. These soils are on valley bottoms, fans, and stream terraces. Elevation is 5,000 to 6,200 feet. Slopes are 0 to 8 percent. Average annual precipitation is 10 to 14 inches, and mean annual air temperature is 48 to 51 degrees F.

These Redbank soils are classified as coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents.

Typical pedon of Redbank fine sandy loam, 0 to 3 percent slopes, in Fisher Valley, about 3 miles south and 3 miles east of Fisher Towers; 1,800 feet north and 300 feet east of the southwest corner of sec. 25, T. 24 S., R. 24 E.

A1—0 to 2 inches; yellowish red (5YR 4/6) fine sandy loam, reddish brown (5YR 4/4) moist; single grain; loose, slightly sticky and slightly plastic; common very fine roots; noncalcareous; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1—2 to 5 inches; yellowish red (5YR 4/6) fine sandy loam, reddish brown (5YR 4/4) moist; moderate very coarse platy structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C2—5 to 20 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few very fine pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear wavy boundary.

C3—20 to 40 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine roots; few very fine and fine pores; slightly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); clear wavy boundary.

C4—40 to 60 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; massive; slightly hard, friable; common very fine roots; few very fine pores; 10 percent pebbles in discontinuous layers; many thin strata of coarse sand; slightly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6).

The profile commonly is calcareous throughout, but some pedons have a thin noncalcareous A horizon.

The A horizon has value of 4 to 6 when dry and 3 to 5 when moist, and it has chroma of 3 to 6. It commonly is very fine sandy loam, fine sandy loam, loamy fine sand, or silty clay loam, but in some pedons there are layers of loam or very gravelly fine sandy loam. The A horizon is 8 to 28 percent clay. It commonly is slightly calcareous or moderately calcareous and is mildly alkaline to strongly alkaline.

The C horizon has hue of 5YR or 7.5YR, value of 4 to 7 when dry and 3 to 6 when moist, and chroma of 3 to 6. It commonly is fine sandy loam, very fine sandy loam, loamy fine sand, loam, or sandy clay loam. Thin strata of sand that is medium textured or coarser are present in some pedons. The C horizon is 3 to 26 percent clay and 0 to 10 percent pebbles. It averages 5 to 18 percent clay in the particle size control section. The C horizon is slightly calcareous or moderately calcareous and is moderately alkaline to very strongly alkaline.

Richens Series

The Richens series consists of very deep, well drained, very slowly permeable soils that formed in glacial till derived dominantly from mixed sedimentary and igneous rock. These soils are on ground moraines. Elevation is 8,600 to 10,400 feet. Slopes are 3 to 15 percent. Average annual precipitation is 25 to 30 inches, and mean annual air temperature is 35 to 38 degrees F.

These Richens soils are classified as fine, montmorillonitic Argic Pachic Cryoborolls.

Typical pedon of a Richens silt loam in an area of Richens-Herd complex, 3 to 15 percent slopes, about 1 mile south and 1.5 miles west of Miners Basin, on Bald Mesa; 2,300 feet north and 1,500 feet west of the southeast corner of sec. 20, T. 26 S., R. 23 E.

A11—0 to 7 inches; dark brown (7.5YR 3/2) silt loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; many very fine and fine roots, common medium roots, and few coarse roots; common fine and medium pores; 10 percent pebbles; neutral (pH 6.8); clear smooth boundary.

A12—7 to 17 inches; dark brown (7.5YR 3/2) gravelly silty clay loam, very dark brown (7.5YR 2/2) moist; weak medium prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common very fine, fine, and medium roots and few coarse roots; many very fine and fine pores and common medium pores; 15 percent pebbles, 3 percent cobbles, and 5 percent stones; neutral (pH 6.8); clear wavy boundary.

A2—17 to 19 inches; brown (7.5YR 5/2) gravelly silty clay loam, brown (7.5YR 4/2) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots and few fine, medium, and coarse roots; many very fine, fine, and medium pores; 20 percent pebbles and 5 percent stones; neutral (pH 6.6); abrupt wavy boundary.

B21t—19 to 38 inches; light reddish brown (5YR 6/4) clay, reddish brown (5YR 5/4) moist; strong medium prismatic structure parting to strong medium angular blocky; extremely hard, very firm, very sticky and very plastic; few very fine, fine, and coarse roots; few fine and medium pores; many thick clay films on faces of peds; 10 percent pebbles and 3 percent cobbles; neutral (pH 7.2); clear wavy boundary.

B22t—38 to 43 inches; light reddish brown (2.5YR 6/4) gravelly clay, yellowish red (5YR 4/6) moist; strong medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine pores; common thick clay films on faces of peds; 25 percent pebbles and 5 percent cobbles; neutral (pH 7.2); gradual smooth boundary.

B23t—43 to 60 inches; light reddish brown (2.5YR 6/4) gravelly clay, reddish brown (2.5YR 5/4) moist; strong fine angular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine roots; few fine pores; common thick clay films on faces of peds; 20 percent pebbles and 10 percent cobbles; slightly calcareous; carbonates are in threads and coatings on rock fragments; neutral (pH 7.2).

The mollic epipedon is 17 to 20 inches thick. Thickness of the solum is 40 to 60 inches or more.

The A1 horizon has value of 4 to 6 when dry and 2.5 to 4.0 when moist, and it has chroma of 1 or 2. It commonly is loam but is gravelly sandy clay loam, silt loam, or gravelly silty clay loam in some pedons. The A horizon is 15 to 30 percent clay and 10 to 30 percent rock fragments. It is slightly acid or neutral.

The A2 horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and chroma of 2 to 4. It is gravelly sandy clay loam or gravelly silty clay loam.

The B2t horizon has hue of 2.5YR or 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. It is clay or gravelly clay and is 35 to 60 percent clay. The rock fragment content averages 5 to 15 percent in the upper 20 inches in some pedons but is 15 to 45 percent in some layers below this depth. This horizon mainly is noncalcareous but is slightly calcareous in some pedons below a depth of 40 inches.

Rizno Series

The Rizno series consists of shallow, well drained, moderately rapidly permeable soils that formed in eolian deposits over residuum derived dominantly from sandstone and interbedded shale. These soils are on structural benches, cuestas, hogbacks, and mesas. Elevation is 4,800 to 7,200 feet. Slopes are 3 to 15 percent. Average annual precipitation is 9 to 14 inches, and mean annual air temperature is 47 to 53 degrees F.

These Rizno soils are classified as loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Typical pedon of a Rizno fine sandy loam in an area of Rock outcrop-Rizno complex, 3 to 15 percent slopes, about 7 miles southwest of La Sal; 1,300 feet south and 300 feet west of the northwest corner of sec. 31, T. 29½ S., R. 24 E.

A1—0 to 2 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable; few fine roots; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

C1—2 to 6 inches; pinkish gray (5YR 6/2) fine sandy loam, dark reddish gray (5YR 4/2) moist; weak medium subangular blocky structure; soft, friable; many very fine roots and common fine roots; many very fine pores and common fine pores; 5 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); clear smooth boundary.

C2—6 to 8 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (2.5YR 5/4) moist; weak medium subangular blocky structure; soft, friable; few very fine and fine roots; many very fine and fine

pores; 10 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

R—8 inches; sandstone.

Depth to bedrock is 4 to 20 inches. The particle size control section is 0 to 35 percent rock fragments and 5 to 18 percent clay.

The A and C horizons have hue of 2.5YR or 5YR, value of 5 to 6 when dry, and chroma of 3 to 6. The A horizon is mildly alkaline or moderately alkaline. The C horizon is loam, fine sandy loam, gravelly fine sandy loam, or gravelly loamy sand. It is moderately alkaline or strongly alkaline.

Sazi Series

The Sazi series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on benches and cuestas. Elevation is 5,600 to 7,000 feet. Slopes are 1 to 15 percent. Average annual precipitation is 9 to 12 inches, and mean annual air temperature is 47 to 51 degrees F.

These Sazi soils are classified as coarse-loamy, mixed, mesic Ustollic Calciorthids.

Typical pedon of a Sazi very fine sandy loam in an area of Windwhistle-Sazi very fine sandy loams, 1 to 3 percent slopes, about 0.7 mile southwest of Hatch Rock, 2,000 feet north and 1,100 feet east of the southwest corner of sec. 36, T. 29½ S., R. 22 E.

A1—0 to 2 inches; yellowish red (5YR 5/6) very fine sandy loam, reddish brown (5YR 4/4) moist; weak thin platy structure; soft, very friable; common very fine and fine roots and few medium roots; common very fine and fine pores; slightly calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

B2—2 to 17 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, very friable; common very fine and fine roots and few medium roots; common very fine and fine pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

Cca—17 to 32 inches; light reddish brown (5YR 6/4) very fine sandy loam, yellowish red (5YR 5/6) moist; massive; hard, firm, slightly plastic; few very fine and fine roots; common very fine and fine pores; strongly calcareous; carbonates are in veins and soft masses; many cicada casts; strongly alkaline (pH 8.6); abrupt smooth boundary.

R—32 inches; sandstone.

Thickness of the solum and depth to secondary carbonates are 7 to 20 inches. The particle size control section averages 10 to 18 percent clay. Depth to bedrock is 20 to 40 inches. The profile has hue of 7.5YR or 5YR.

The A horizon has chroma of 4 or 6 when moist. It is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

The B horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 4 to 6 when moist. It is very fine sandy loam or fine sandy loam. This horizon is moderately alkaline or strongly alkaline.

The Cca horizon has value of 6 or 7 when dry and 4 or 5 when moist, and it has chroma of 4 to 6. It is fine sandy loam or very fine sandy loam.

Sedillo Series

The Sedillo series consists of very deep, well drained, moderately slowly permeable soils that formed in alluvium and some colluvium derived dominantly from intrusive igneous and sedimentary rock. These soils are on alluvial fans. Elevation is 4,400 to 7,300 feet. Slopes are 3 to 60 percent. Average annual precipitation is 9 to 16 inches, and mean annual air temperature is 45 to 53 degrees F.

These Sedillo soils are classified as loamy-skeletal, mixed, mesic Ustollic Haplargids.

Typical pedon of Sedillo very stony fine sandy loam, 3 to 15 percent slopes, about 2 miles southeast of Castleton; 2,580 feet north and 1,400 feet west of the southeast corner of sec. 32, T. 25 S., R. 24 E.

A1—0 to 7 inches; dark reddish gray (5YR 4/2) very stony fine sandy loam, dark reddish brown (5YR 3/2) moist; weak medium subangular blocky structure; soft, friable; few coarse, medium, and fine roots and common very fine roots; few medium random tubular pores and common fine and very fine random tubular pores; 10 percent stones, 15 percent cobbles, and 20 percent pebbles; mildly alkaline (pH 7.8); clear wavy boundary.

B2t—7 to 12 inches; reddish brown (5YR 4/3) very cobbly clay loam, reddish brown (5YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few medium roots and common fine and very fine roots; few medium random tubular pores and common fine and very

fine random tubular pores; few moderately thick clay films on faces of peds; 5 percent stones, 20 percent cobbles, and 25 percent pebbles; mildly alkaline (pH 7.8); clear wavy boundary.

Cca—12 to 45 inches; pinkish white (5YR 8/2) very cobbly sandy loam, light brown (7.5YR 6/4) moist; massive; hard, friable, sticky and slightly plastic; few medium, fine, and very fine roots; 25 percent cobbles and stones and 25 percent pebbles; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); clear wavy boundary.

C—45 to 60 inches; light reddish brown (5YR 6/4) very cobbly fine sandy loam, yellowish red (5YR 5/6) moist; massive; soft, very friable; few medium, common fine, and many very fine random tubular pores; 30 percent cobbles and 25 percent pebbles; moderately calcareous; carbonates are disseminated and in few fine veins and thin coatings on rock fragments; strongly alkaline (pH 8.6).

Thickness of the solum is 9 to 15 inches. Rock fragment content typically is 35 to 65 percent in the solum but ranges to more than 65 percent in the Cca horizon. The particle size control section is 18 to 27 percent clay. The profile has hue of 5YR or 7.5YR.

The A horizon has value of 4 or 5 when dry and 2 to 4 when moist, and it has chroma of 2 to 6. It is noncalcareous or slightly calcareous and is mildly alkaline or moderately alkaline.

The B2t horizon has value of 3 to 6 when dry and 3 to 5 when moist, and it has chroma of 3 to 6. Texture dominantly is very cobbly clay loam but ranges to very cobbly sandy clay loam or very cobbly loam. The B2t horizon is noncalcareous or slightly calcareous and is mildly alkaline to strongly alkaline.

The Cca horizon has value of 6 to 8 when dry and 4 to 6 when moist, and it has chroma of 2 to 5. Texture is very cobbly sandy loam or very cobbly sandy clay loam. The Cca horizon is strongly calcareous or very strongly calcareous and is moderately alkaline or strongly alkaline.

Shalako Series

The Shalako series consists of shallow, well drained, moderately rapidly permeable soils that formed in residuum derived dominantly from sandstone. These soils are on dissected cuesta summits. Elevation is 6,500 to 7,000 feet. Slopes are 3 to 15 percent. Average annual precipitation is 12 to 14 inches, and mean annual air temperature is 45 to 47 degrees F.

These Shalako soils are classified as loamy, mixed, mesic Lithic Ustollic Calciorthids.

Typical pedon of a Shalako gravelly fine sandy loam in an area of Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes, about 4 miles southwest of La Sal; 2,100 feet north and 1,780 feet east of the southwest corner of sec. 21, T. 29 S., R. 24 E.

A1—0 to 2 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; soft, very friable; few fine roots; 15 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.3); abrupt smooth boundary.

B2ca—2 to 6 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; slightly hard, very friable; common fine and few medium roots; few fine pores; 30 percent pebbles; moderately calcareous; carbonates are disseminated and in coatings on rock fragments; moderately alkaline (pH 8.3); clear smooth boundary.

Cca—6 to 13 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; few very fine, fine, and medium roots; 30 percent pebbles; strongly calcareous; carbonates occur as moderately thick coatings on rock fragments; strongly alkaline (pH 8.6); abrupt smooth boundary.

R—13 inches; sandstone.

Depth to bedrock is 10 to 20 inches. The particle size control section is 15 to 35 percent rock fragments.

The A horizon has value of 3 or 4 when moist and chroma of 3 or 4. It is gravelly fine sandy loam or gravelly sandy loam. This horizon is slightly calcareous or moderately calcareous.

The B horizon is fine sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

The Cca horizon has value of 5 to 7 when dry and chroma of 4 to 6. It is gravelly fine sandy loam or fine sandy loam. This horizon is moderately alkaline or strongly alkaline.

Sheppard Series

The Sheppard series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are in broad valleys and on structural benches. Elevation is 4,600 to 5,000 feet.

Slopes are 2 to 8 percent. Average annual precipitation is 6 to 8 inches, and mean annual air temperature is 52 to 54 degrees F.

These Sheppard soils are classified as mixed, mesic Typic Torripsamments.

Typical pedon of Sheppard fine sand, 2 to 8 percent slopes, about 1 mile north of Canyonlands Resort; 600 feet north and 200 feet east of the southwest corner of sec. 9, T. 30 S., R. 20 E.

A1—0 to 3 inches; red (2.5YR 5/6) fine sand, reddish brown (2.5YR 4/4) moist; single grain; loose; many very fine and fine roots and common medium roots; 5 percent fine pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.2); abrupt smooth boundary.

C1—3 to 30 inches; red (2.5YR 5/6) fine sand, red (2.5YR 4/6) moist; massive; soft, very friable; common medium roots and many very fine and fine roots; common very fine pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 9.0); gradual smooth boundary.

C2—30 to 42 inches; reddish yellow (5YR 6/6) loamy fine sand, red (2.5YR 4/6) moist; massive; soft, very friable; few very fine and fine roots; 3 percent fine pebbles; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 9.0); gradual smooth boundary.

C3—42 to 60 inches; reddish yellow (5YR 7/6) loamy sand, light red (2.5YR 6/6) moist; massive; hard, friable, slightly sticky; few very fine and fine roots; 10 percent pebbles; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.8).

The profile has hue of 2.5YR or 5YR, value of 5 to 7 when dry, and chroma of 4 to 6. It is 0 to 5 percent pebbles. It commonly is fine sand but ranges to loamy fine sand. It commonly is slightly calcareous or moderately calcareous but is strongly calcareous below a depth of 40 inches in some pedons. The profile is moderately alkaline or strongly alkaline.

Sirref Series

The Sirref series consists of very deep, well drained, slowly permeable soils that formed in alluvium derived dominantly from diorite. These soils are on glacial outwash fans. Elevation is 8,200 to 9,000 feet. Slopes are 4 to 30 percent. Average annual precipitation is 18 to 25 inches, and mean annual air temperature is 41 to 44 degrees F.

These Sirref soils are classified as clayey-skeletal, montmorillonitic Typic Argiborolls.

Typical pedon of Sirref loam, 4 to 8 percent slopes, about 2 miles north of the La Sal Guard Station; 2,300 feet south and 150 feet west of the northeast corner of sec. 10, T. 28 S., R. 25 E.

A1—0 to 3 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure parting to weak fine granular; soft, friable; many very fine and fine roots and common medium roots; common fine tubular pores; 8 percent pebbles, 4 percent cobbles, and 1 percent stones; mildly alkaline (pH 7.7); clear wavy boundary.

B1t—3 to 9 inches; reddish brown (5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine, fine, and medium roots; common fine tubular pores; few thin clay films on faces of peds; 15 percent pebbles, 5 percent cobbles, and 2 percent stones; mildly alkaline (pH 7.7); clear wavy boundary.

B21t—9 to 15 inches; reddish brown (5YR 4/4) gravelly clay, dark reddish brown (5YR 3/3) moist; strong coarse subangular blocky structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; common fine and medium roots; few fine tubular pores; many thick clay films on faces of peds and lining pores; 20 percent pebbles, 10 percent cobbles, and 3 percent stones; mildly alkaline (pH 7.8); gradual wavy boundary.

B22t—15 to 33 inches; yellowish red (5YR 4/6) very cobbly clay, reddish brown (5YR 4/4) moist; strong coarse angular blocky structure parting to strong medium angular blocky; extremely hard, very firm, very sticky and very plastic; few fine and medium roots; few fine tubular pores; continuous thick clay films on faces of peds and lining pores; 30 percent pebbles, 20 percent cobbles, and 5 percent stones; mildly alkaline (pH 7.8); clear wavy boundary.

B23tca—33 to 48 inches; yellowish red (5YR 4/6) extremely cobbly clay, yellowish red (5YR 5/6) moist; strong medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; few fine and medium roots; common fine tubular pores; many thick clay films on faces of peds and lining pores; 35 percent pebbles, 35 percent cobbles, and 5 percent stones; strongly calcareous; carbonates are in few soft masses and coatings on rock fragments; moderately alkaline (pH 7.9); abrupt wavy boundary.

Cca—48 to 60 inches; pink (7.5YR 7/4) very cobbly clay

loam, brown (7.5YR 5/4) moist; massive; soft, firm, sticky and plastic; few fine roots; 25 percent pebbles, 25 percent cobbles, and 5 percent stones; strongly calcareous; carbonates are in common fine soft masses and coatings on rock fragments; moderately alkaline (pH 8.4).

The mollic epipedon is 11 to 15 inches thick. Depth to the upper boundary of the argillic horizon is 3 to 14 inches. Rock fragment content averages 35 to 50 percent in the particle size control section, and clay content averages 35 to 45 percent.

The A horizon has hue of 5YR or 7.5YR, value of 3 to 4 when dry and 2 or 3 when moist, and chroma of 2 or 3. It commonly is loam or cobbly loam but includes very cobbly loam. It is 15 to 25 percent clay. This horizon is neutral or mildly alkaline.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 to 5 when moist, and chroma of 2 to 6. The upper part of the B2t horizon is gravelly or very gravelly clay or very gravelly clay loam and is 35 to 45 percent clay. The lower part is very cobbly clay, extremely stony sandy clay, and extremely cobbly clay and is 40 to 50 percent clay. The upper part of the B2t horizon is 35 to 50 percent rock fragments, and the lower part is 50 to 75 percent. The B2t horizon is noncalcareous in the upper part and is slightly calcareous to strongly calcareous in the lower part. This horizon is neutral to moderately alkaline.

The Cca, where present, is extremely cobbly clay loam or very stony sandy clay loam and is 30 to 40 percent clay. This horizon is strongly calcareous or very strongly calcareous.

Skylick Series

The Skylick series consists of very deep, well drained, moderately permeable soils that formed in landslide deposits, slopewash, and outwash derived dominantly from diorite and mixed sedimentary rock. These soils are on mountainsides and cuestas. Elevation is 8,500 to 9,500 feet. Slopes are 5 to 30 percent. Average annual precipitation is 25 to 30 inches, and mean annual air temperature is 37 to 40 degrees F.

These Skylick soils are classified as fine-loamy, mixed Cryic Pachic Paleborolls.

Typical pedon of Skylick loam, 5 to 30 percent slopes, about 1 mile south of Mount Tukuhnikivatz; 2,000 feet north and 2,050 feet west of the southeast corner of sec. 36, T. 27 S., R. 24 E.

A11—0 to 4 inches; dark gray (N 4/0) loam, very dark brown (7.5YR 2/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine and medium roots; many fine pores; 2 percent pebbles; neutral (pH 6.8); clear smooth boundary.

A12—4 to 29 inches; dark gray (N 4/0) loam, very dark brown (7.5YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots and common fine, medium, and coarse roots; many very fine pores and common fine pores; 3 percent pebbles; slightly acid (pH 6.2); gradual smooth boundary.

B1—29 to 37 inches; gray (N 5/0) loam, very dark brown (7.5YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, and coarse roots and common medium roots; many very fine and common fine pores; 10 percent pebbles; slightly acid (pH 6.2); clear smooth boundary.

B21t—37 to 50 inches; light brown (7.5YR 6/4) gravelly clay loam, brown (7.5YR 4/4) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; common fine pores; many moderately thick clay films on faces of peds and in pores; 10 percent pebbles and 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

B22t—50 to 60 inches; brown (7.5YR 5/4) cobbly sandy clay loam, brown (7.5YR 4/4) moist; hard, firm, sticky and plastic; few fine and medium roots; common fine pores; many moderately thick clay films on faces of peds and in pores; 10 percent pebbles and 20 percent cobbles; slightly acid (pH 6.4).

The mollic epipedon is 24 to 37 inches thick. Thickness of the solum is more than 40 inches. Depth to the upper boundary of the B2t horizon ranges from 24 to 38 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5 when dry, and chroma of 0 to 3. It commonly is loam but ranges from fine sandy loam to silt loam. This horizon is slightly acid or neutral.

The B2t horizon has value of 5 to 7 when dry and chroma of 4 to 6. It is cobbly sandy clay loam, cobbly clay loam, or gravelly clay loam. The B2t horizon is 5 to 30 percent pebbles and 5 to 20 percent cobbles. It is slightly acid or neutral.

Strych Series

The Strych series consists of very deep, well drained, moderately rapidly permeable soils that formed in mixed alluvium and colluvium derived from sandstone, shale, and diorite. These soils are on alluviul fans and talus cones. Elevation is 5,700 to 7,100 feet. Slopes are 8 to 60 percent. Average annual precipitation is 10 to 16 inches, and mean annual air temperature is 45 to 51 degrees F.

These Strych soils are classified as loamy-skeletal, mixed, mesic Ustollic Calciorthids.

Typical pedon of Strych very cobbly fine sandy loam, 8 to 30 percent slopes, about 18 miles southeast of Moab; 1,800 feet south and 2,580 feet east of the northwest corner of sec. 14, T. 28 S., R. 23 E.

A1—0 to 3 inches; brown (7.5YR 5/4) very cobbly fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable; common very fine and fine roots; 15 percent pebbles, 15 percent cobbles, and 5 percent stones; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); clear smooth boundary.

B2—3 to 10 inches; brown (7.5YR 5/4) cobbly fine sandy loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky; many very fine and fine roots and few medium roots; few very fine and fine pores; 10 percent pebbles and 20 percent cobbles; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); clear wavy boundary.

C1ca—10 to 16 inches; light brown (7.5YR 6/4) very gravelly fine sandy loam, brown (7.5YR 5/4) moist; soft, very friable; common very fine and fine roots and few medium and coarse roots; 30 percent pebbles and 10 percent cobbles; strongly calcareous; carbonates occur as thick coatings on rock fragments; strongly alkaline (pH 8.6); gradual smooth boundary.

C2ca—16 to 25 inches; pinkish gray (5YR 7/2) very gravelly fine sandy loam, light reddish brown (5YR 6/3) moist; massive; soft, very friable; few very fine and fine roots; 50 percent pebbles and 5 percent cobbles; strongly calcareous; carbonates occur as thick coatings on rock fragments; strongly alkaline (pH 8.6); gradual smooth boundary.

C3ca—25 to 35 inches; pink (5YR 7/3) very gravelly fine sandy loam, light reddish brown (5YR 6/4) moist; massive; soft, very friable; few very fine and fine roots; 40 percent cobbles and 15 percent pebbles; strongly calcareous; carbonates occur as coatings on rock fragments; strongly alkaline (pH 8.6); clear smooth boundary.

C4ca—35 to 60 inches; pink (5YR 7/3) extremely gravelly loamy sand, reddish brown (5YR 5/4) moist; single grain; soft, very friable; 45 percent pebbles and 15 percent cobbles; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.8).

Depth to the calcic horizon is 10 to 39 inches. The particle size control section is 35 to 65 percent rock fragments and 11 to 18 percent clay. The profile has hue of 5YR to 10YR.

The A horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 3 to 6. It is mildly alkaline or moderately alkaline.

The B horizon has value of 4 to 6 when dry and chroma of 3 to 6. It is gravelly fine sandy loam or cobbly fine sandy loam. This horizon is moderately alkaline or strongly alkaline.

The C horizon has value of 6 to 8 when dry and 5 or 6 when moist, and it has chroma of 2 to 4. It is very gravelly fine sandy loam, extremely gravelly fine sandy loam, or extremely cobbly fine sandy loam. This horizon is 15 to 40 percent calcium carbonate equivalent and is moderately alkaline or strongly alkaline.

Thoroughfare Series

The Thoroughfare series consists of very deep, well drained, moderately rapidly permeable soils that formed in alluvium derived dominantly from sandstone and shale. These soils are on alluvial bottoms, flood plains, terraces, and valley floors. Elevation is 3,800 to 5,200 feet. Slopes are 0 to 8 percent. Average annual precipitation is 6 to 9 inches, and mean annual air temperature is 52 to 56 degrees F.

These Thoroughfare soils are classified as coarse-loamy, mixed (calcareous), mesic Typic Torrifluvents.

Typical pedon of Thoroughfare fine sandy loam, 2 to 8 percent slopes, about 5 miles northeast of Fisher Mesa, in Professor Valley; 1,800 feet north and 1,525 feet west of the southeast corner of sec. 11, T. 23 S., R. 24 E.

A1—0 to 2 inches; dark red (2.5YR 3/6) fine sandy loam, dark red (2.5YR 3/6) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few very fine roots; moderately calcareous; carbonates are disseminated;

moderately alkaline (pH 8.2); abrupt smooth boundary.

C1—2 to 5 inches; red (2.5YR 4/6) fine sandy loam, reddish brown (2.5YR 4/4) moist; moderate thick platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C2—5 to 11 inches; red (2.5YR 4/6) fine sandy loam, reddish brown (2.5YR 4/4) moist; moderate thick platy structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky; common very fine and fine roots; many very fine, common fine, and few medium pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

C3—11 to 15 inches; red (2.5YR 4/6) fine sandy loam, reddish brown (2.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky; many very fine and fine roots; many very fine pores; 5 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

C4—15 to 29 inches; red (2.5YR 5/6) gravelly loamy sand, reddish brown (2.5YR 4/4) moist; massive; soft, very friable; many very fine and few fine roots; many very fine pores; 25 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); abrupt smooth boundary.

C5—29 to 40 inches; red (2.5YR 5/6) fine sandy loam, dark red (2.5YR 3/6) moist; massive; hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and fine pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4); clear smooth boundary.

C6—40 to 63 inches; red (2.5YR 5/6) fine sandy loam, dark red (2.5YR 3/6) moist; massive; hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine pores; 10 percent pebbles; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.4).

The particle size control section is 0 to 15 percent pebbles and cobbles.

The A horizon has hue of 2.5YR or 5YR, value of 3 to 6 when dry, and chroma of 3 to 6. It commonly is fine sandy loam or loam but ranges to loamy fine sand, very fine sandy loam, or sandy loam. This horizon is moderately alkaline or strongly alkaline and is slightly calcareous or moderately calcareous.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 to 7 when dry, and chroma of 3 to 6. It commonly is fine sandy loam but includes thin strata of sand to clay loam or very gravelly sand to very gravelly fine sandy loam. The C horizon is 0 to 25 percent cobbles and 0 to 30 percent pebbles.

Tolman Variant

The Tolman Variant consists of shallow, well drained, moderately permeable soils that formed in residuum derived dominantly from sandstone. These soils are on cuestas and mountainsides. Elevation is 8,000 to 9,000 feet. Slopes are 3 to 20 percent. Average annual precipitation is 20 to 25 inches, and mean annual air temperature is 38 to 42 degrees F.

These Tolman soils are classified as loamy-skeletal, mixed Lithic Argiborolls.

Typical pedon of a Tolman Variant cobbly loam in an area of Dranyon-Tolman Variant complex, 8 to 20 percent slopes, about 0.5 mile east of Taylor Flat; 2,000 feet east and 1,780 feet north of the northwest corner of sec. 13, T. 26 S., R. 25 E.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) cobbly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable; many fine and medium roots; common fine and medium pores; 10 percent pebbles and 20 percent cobbles; neutral (pH 6.6); clear smooth boundary.

A12—3 to 8 inches; brown (7.5YR 4/2) extremely cobbly loam, very dark brown (7.5YR 2/2) moist; moderate fine and medium granular structure; soft, very friable; common fine, medium, and coarse roots; common fine and medium pores; 20 percent pebbles, 50 percent cobbles, and 5 percent stones; neutral (pH 6.6); clear smooth boundary.

B2t—8 to 17 inches; reddish brown (5YR 5/4) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; weak and moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; common fine, medium, and coarse roots; common fine pores; common thin clay films on faces of peds; 20 percent pebbles, 35 percent cobbles, and 10 percent stones; slightly acid (pH 6.4); gradual wavy boundary.

R—17 inches; sandstone.

The mollic epipedon is 7 to 12 inches thick. The

solum is 10 to 20 inches thick and rests directly on sandstone.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is 5 to 10 percent pebbles, 0 to 20 percent cobbles, and 0 to 5 percent stones.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4. It is extremely cobbly loam, very cobbly sandy clay loam, or very gravelly clay loam and is 18 to 28 percent clay. The B2t horizon is 35 to 75 percent rock fragments, of which 10 to 30 percent is pebbles, 10 to 40 percent is cobbles, and 0 to 15 percent is stones or flagstones.

The Tolman Variant soils in this survey area have redder color and more moisture available for plant growth than do the soils of the Tolman series.

Tomasaki Series

The Tomasaki series consists of very deep, well drained, slowly permeable soils that formed in alluvium and colluvium derived dominantly from porphyritic diorite and sandstone. These soils are on glacial outwash fans and mountainsides. Elevation is 7,800 to 9,200 feet. Slopes are 3 to 65 percent. Average annual precipitation is 17 to 25 inches, and mean annual air temperature is 39 to 42 degrees F.

These Tomasaki soils are classified as fine, montmorillonitic Typic Argiborolls.

Typical pedon of Tomasaki loam, 3 to 15 percent slopes, about 7.5 miles east of Castleton; 20 feet south and 800 feet west of the northeast corner of sec. 32, T. 25 S., R. 25 E.

A1—0 to 11 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky; common very fine roots and few medium and coarse roots; common very fine pores and few fine pores; 5 percent pebbles; noncalcareous; neutral (pH 6.6); clear wavy boundary.

B21t—11 to 17 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; extremely hard, extremely firm, sticky and plastic; few very fine, medium, and coarse roots and common fine roots; few very fine and fine pores; many moderately thick clay films on faces of peds; 5 to 10 percent pebbles; neutral (pH 6.6); clear smooth boundary.

B22t—17 to 24 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; weak fine prismatic structure parting to strong medium subangular blocky; extremely hard, extremely firm, sticky and plastic; few very fine, medium, and coarse roots and common fine roots; few very fine and fine pores; many moderately thick clay films on faces of peds; 5 to 10 percent pebbles; neutral (pH 6.6); gradual smooth boundary.

B23t—24 to 34 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; extremely hard, extremely firm, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and fine pores; many moderately thick clay films on faces of peds; 15 percent fine pebbles; neutral (pH 6.8); gradual wavy boundary.

IIB24t—34 to 50 inches; reddish brown (5YR 4/4) very cobbly clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; extremely hard, extremely firm, sticky and plastic; few fine, medium, and coarse roots; few very fine pores; many moderately thick clay films on faces of peds; 20 percent pebbles, 20 percent cobbles, and 5 percent stones; neutral (pH 6.8); gradual wavy boundary.

IIC—50 to 60 inches; light brown (7.5YR 6/4) cobbly clay loam, brown (7.5YR 5/4) moist; massive; extremely hard, extremely firm, slightly sticky and plastic; few fine roots; few very fine pores; 20 percent cobbles and 5 percent pebbles; neutral (pH 6.8).

The mollic epipedon is 11 to 15 inches thick.

The A horizon has hue of 7.5YR or 10YR. It is 0 to 5 percent pebbles and 0 to 10 percent cobbles. This horizon is neutral or mildly alkaline.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 to 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is clay or clay loam in the upper part and is very cobbly clay loam, cobbly clay loam, or very cobbly clay in the lower part. The upper 20 inches of the B2t horizon averages 35 to 45 percent clay and 5 to 15 percent rock fragments. This horizon is neutral or mildly alkaline.

Toone Series

The Toone series consists of very deep, well drained, slowly permeable soils that formed in alluvium derived dominantly from diorite. These soils are on outwash fans and in landslide areas. Elevation is 8,400 to 9,800 feet. Slopes are 4 to 30 percent. Average annual

precipitation is 20 to 30 inches, and mean annual air temperature is 35 to 44 degrees F.

These Toone soils are classified as clayey-skeletal, montmorillonitic Cryic Pachic Paleborolls.

Typical pedon of a Toone loam in an area of Toone-Sirref-Herm complex, 10 to 30 percent slopes, about 0.5 mile south and 2.3 miles west of Warner Lake; 1,500 feet north and 1,680 feet west of the southeast corner of sec. 30, T. 26 S., R. 24 E.

O1—1 inch to 0; undecomposed organic litter.

A11—0 to 8 inches; very dark gray (5YR 3/1) loam, black (5YR 2.5/1) moist; moderate medium granular structure; soft, friable, slightly plastic; many very fine roots, common fine roots, and few medium and coarse roots; common very fine and fine pores and few medium and coarse pores; 3 percent pebbles; neutral (pH 6.6); gradual smooth boundary.

A12—8 to 19 inches; dark brown (7.5YR 3/2) silt loam, black (5YR 2.5/1) moist; strong fine subangular blocky structure; slightly hard, slightly firm, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine pores and few medium pores; 5 percent pebbles; neutral (pH 6.8); clear wavy boundary.

A13—19 to 25 inches; dark brown (7.5YR 3/2) loam, dark reddish brown (5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly plastic; few very fine, fine, and medium roots; few very fine and medium pores and common fine pores; 10 percent pebbles; neutral (pH 6.6); clear wavy boundary.

B21t—25 to 33 inches; brown (7.5YR 5/4) gravelly clay loam, reddish brown (5YR 4/4) moist; strong medium subangular blocky structure; hard, very firm, sticky and very plastic; few very fine and fine roots; few very fine pores and common fine and medium pores; common moderately thick clay films on faces of peds; 15 percent pebbles and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

B22t—33 to 38 inches; reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4) moist; moderate fine prismatic structure parting to strong fine subangular blocky; very hard, very firm, sticky and very plastic; few very fine and fine roots; common very fine, many fine, and few medium pores; many moderately thick clay films on faces of peds; 30 percent pebbles, 5 percent cobbles, and 5 percent stones; neutral (pH 7.2); clear wavy boundary.

B23t—38 to 60 inches; reddish brown (5YR 5/4) very stony clay, reddish brown (5YR 4/4) moist; moderate fine prismatic structure parting to strong fine subangular blocky; very hard, very firm, sticky and very plastic; few very fine and fine roots; few very fine, fine, medium, and coarse pores; common thick clay films on faces of peds; 20 percent stones, 10 percent cobbles, and 20 percent pebbles; neutral (pH 7.2).

The mollic epipedon is 24 to 30 inches thick. The combined thickness of the A1 and B2t horizons is 60 inches or more.

The A1 horizon has hue of 5YR to 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 1 to 3. It is loam or silt loam and is 0 to 15 percent rock fragments.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry, and chroma of 4 to 6. It is gravelly to very cobbly clay loam or very gravelly to very stony clay. The upper 20 inches of the B2t horizon averages 35 to 50 percent clay and 35 to 60 percent rock fragments. Individual subhorizons are 30 to 60 percent clay and 20 to 65 percent rock fragments.

Trail Series

The Trail series consists of very deep and somewhat excessively drained, rapidly permeable soils that formed in alluvium derived dominantly from sandstone. These soils are on valley bottoms. Elevation is 4,000 to 5,000 feet. Slopes are 0 to 5 percent. Average annual precipitation is 7 to 9 inches, and mean annual air temperature is 52 to 53 degrees F.

These Trail soils are classified as sandy, mixed, mesic Typic Torrifluvents.

Typical pedon of Trail fine sand, 0 to 5 percent slopes, about 6 miles north of Castle Rock; 200 feet south and 800 feet east of the northwest corner of sec. 11, T. 23 S., R. 24 E.

A1—0 to 3 inches; reddish brown (2.5YR 4/4) fine sand, dark reddish brown (2.5YR 3/4) moist; single grain; loose; few very fine, fine, and medium roots; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

C1—3 to 17 inches; reddish brown (2.5YR 4/4) sand, dark reddish brown (2.5YR 3/4) moist; massive; soft, very friable; many very fine roots, common fine roots, and few medium roots; many very fine pores; moderately calcareous; carbonates are disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

C2—17 to 21 inches; yellowish red (5YR 4/6) sand, dark red (2.5YR 3/6) moist; massive; slightly hard, very friable; common very fine and few fine roots; many very fine pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); abrupt smooth boundary.

C3—21 to 25 inches; reddish brown (2.5YR 4/4) coarse sand, dark reddish brown (2.5YR 3/4) moist; single grain; loose; common very fine and few fine roots; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.6); abrupt smooth boundary.

C4—25 to 39 inches; reddish brown (2.5YR 4/4) fine sandy loam, dark red (2.5YR 2/6) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine pores and common medium pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

C5—39 to 61 inches; reddish brown (2.5YR 4/4) coarse sand, dark reddish brown (2.5YR 3/4) moist; massive; hard, very friable; common very fine roots and few fine and medium roots; many very fine and common fine pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 9.0); clear smooth boundary.

C6—61 to 67 inches; yellowish red (5YR 4/6) very fine sandy loam, dark reddish brown (2.5YR 3/4) moist; massive; slightly hard, very friable, slightly sticky; common very fine roots and few fine and medium roots; many very fine pores and few fine pores; moderately calcareous; carbonates are disseminated; strongly alkaline (pH 9.0).

The profile has hue of 2.5YR or 5YR, value of 4 or 5 when dry, and chroma of 4 to 6 throughout.

The A horizon commonly is sand or loamy fine sand but is fine sandy loam in a few pedons.

The C horizon dominantly is sand or coarse sand but has thin strata of very gravelly coarse sand, very fine sandy loam, or sandy clay loam. This horizon is moderately alkaline or strongly alkaline.

Tukuhnik Series

The Tukuhnik series consists of deep, well drained, slowly permeable soils that formed in residuum derived dominantly from interbedded shale, siltstone, and sandstone. These soils are on cuestas and benches. Elevation is 7,800 to 8,600 feet. Slopes are 3 to 10 percent. Average annual precipitation is 17 to 20 inches, and mean annual air temperature is 41 to 43 degrees F.

These Tukuhnik soils are classified as fine, montmorillonitic Typic Argiborolls.

Typical pedon of Tukuhnik loam, 3 to 10 percent slopes, about 4.5 miles north of Old La Sal; 1,600 feet south and 50 feet east of the northwest corner of sec. 1, T. 28 S., R. 25 E.

A1—0 to 7 inches; brown (7.5YR 4/3) loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common fine, medium, and coarse roots; few fine pores; 3 percent pebbles; mildly alkaline (pH 7.4); clear smooth boundary.

B1—7 to 13 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; slightly hard, firm, sticky and plastic; common fine, medium, and coarse roots; few fine pores; 5 percent pebbles and 2 percent cobbles; mildly alkaline (pH 7.6); clear wavy boundary.

B21t—13 to 34 inches; reddish brown (5YR 4/4) silty clay loam, reddish brown (5YR 4/4) moist; strong coarse prismatic structure parting to strong medium subangular blocky; hard, very firm, very sticky and plastic; few fine and medium roots; few fine pores; many thick clay films on faces of peds; 5 percent pebbles; moderately alkaline (pH 8.0); clear wavy boundary.

B22tca—34 to 41 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; very hard, very firm, very sticky and plastic; few fine roots; few fine pores; common thick clay films on faces of peds; 5 percent pebbles; moderately calcareous; carbonates are in common medium filaments and threads; strongly alkaline (pH 8.7); abrupt smooth boundary.

B23tca—41 to 51 inches; yellowish red (5YR 5/6) silty clay, yellowish red (5YR 4/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, extremely firm, very sticky and plastic; few very fine roots; few fine pores; many moderately thick clay films on faces of peds; 10 percent pebbles; strongly calcareous; carbonates are disseminated; strongly alkaline (pH 8.7); abrupt smooth boundary.

R—51 inches; soft siltstone.

The mollic epipedon is 10 to 15 inches thick. Depth to visible secondary carbonates is 30 to 40 inches.

Depth to soft siltstone or shale is 40 to 60 inches. The profile has hue of 5YR or 7.5YR.

The A horizon has value of 3 or 4 when dry and 2 or 3 when moist, and it has chroma of 2 or 3.

The B2t horizon has value of 4 or 5 when dry. It is clay, silty clay loam, or silty clay. This horizon is mildly alkaline or moderately alkaline.

The B2tca horizon has value of 5 to 7 when dry and 4 to 6 when moist, and it has chroma of 3 to 6 when dry or moist. This horizon is clay, silty clay, or silty clay loam. It is moderately calcareous or strongly calcareous and is moderately alkaline or strongly alkaline.

Waas Series

The Waas series consists of very deep, well drained, moderately slowly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on outwash fans, benches, and cuestas. Elevation is 7,200 to 7,800 feet. Slopes are 2 to 8 percent. Average annual precipitation is 16 to 20 inches, and mean annual air temperature is 42 to 44 degrees F.

These Waas soils are classified as fine-silty, mixed Aridic Argiborolls.

Typical pedon of Waas very fine sandy loam, 2 to 8 percent slopes, about 0.1 mile north of Old La Sal Schoolhouse; 400 feet north and 2,500 feet west of the southeast corner of sec. 21, T. 28 S., R. 25 E.

A11—0 to 3 inches; reddish brown (5YR 4/3) very fine sandy loam, dark reddish brown (5YR 3/2) moist; weak medium platy structure parting to moderate fine granular; slightly hard, very friable; many fine roots; few very fine interstitial pores; neutral (pH 6.8); abrupt smooth boundary.

A12—3 to 10 inches; reddish brown (5YR 4/3) very fine sandy loam, dark reddish brown (5YR 3/3) moist; weak very thick platy structure; hard, friable, slightly sticky and slightly plastic; many fine roots; few very fine pores; neutral (pH 6.9); clear wavy boundary.

B21t—10 to 22 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; very hard, friable, slightly sticky and slightly plastic; few fine roots; many fine pores; few thin clay films on faces of peds and in pores; neutral (pH 7.2); clear wavy boundary.

B22t—22 to 32 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, slightly sticky and plastic; many fine and few medium pores; few fine roots; thin clay films in channels and as bridges between sand grains; neutral (pH 7.3); clear irregular boundary.

B3—32 to 45 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; many moderately thick clay films on faces of peds; slightly calcareous; calcium carbonate in fine veins; moderately alkaline (pH 7.9); gradual wavy boundary.

C—45 to 60 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; slightly calcareous; carbonates in fine veins; moderately alkaline (pH 8.1).

The A1 horizon has hue of 7.5YR or 5YR, value of 2 or 3 when moist and 4 or 5 when dry, and chroma of 2 or 3. It commonly is very fine sandy loam but ranges to sandy loam or loam. This horizon is neutral or mildly alkaline.

The B2t horizon has hue of 7.5YR or 5YR, value of 3 or 4 when moist and 4 or 5 when dry, and chroma of 4 to 6. It commonly is loam but ranges to loam or silty clay loam. This horizon is 18 to 35 percent clay and less than 15 percent sand that is coarser than very fine sand. The B2t horizon is neutral to moderately alkaline.

The C horizon ranges from loam to clay loam. It is mildly alkaline or moderately alkaline. This horizon commonly is less than 5 percent rock fragments but is 10 to 30 percent cobbles and stones at a depth of 40 inches or more in some pedons where deep eolian deposits overlie glacial outwash.

Windwhistle Series

The Windwhistle series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in eolian deposits derived dominantly from sandstone. These soils are on structural benches and cuestas. Elevation is 5,200 to 6,400 feet. Slopes are 1 to 8 percent. Average annual precipitation is 9 to 14 inches, and mean annual air temperature is 47 to 52 degrees F.

These Windwhistle soils are classified as coarse-loamy, mixed, mesic Ustollic Haplargids.

Typical pedon of a Windwhistle very fine sandy loam in an area of Windwhistle-Sazi very fine sandy loams, 1 to 3 percent slopes, about 2.7 miles south and 0.5 mile

east of Looking Glass Rock; 2,200 feet north and 2,200 feet west of the southeast corner of sec. 33, T. 29 S., R. 23 E.

A1—0 to 2 inches; yellowish red (5YR 5/6) very fine sandy loam, reddish brown (5YR 4/4) moist; weak thin platy structure parting to single grain; loose; few very fine, fine, and medium roots; few very fine and fine pores; moderately alkaline (pH 8.2); abrupt smooth boundary.

B21t—2 to 7 inches; yellowish red (5YR 4/6) very fine sandy loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium platy; slightly hard, friable, sticky and plastic; common very fine and fine roots and many medium roots; common medium and many coarse pores; few thin clay films on faces of peds; moderately alkaline (pH 8.2); clear smooth boundary.

B22t—7 to 13 inches; yellowish red (5YR 4/6) very fine sandy loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; many fine pores and common medium and coarse pores; few thin clay films on faces of peds; moderately alkaline (pH 8.4); clear smooth boundary.

B3ca—13 to 20 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and few fine pores; many cicada casts; slightly calcareous; carbonates in veins and filaments; moderately alkaline (pH 8.4); clear smooth boundary.

C1ca—20 to 25 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; massive; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine pores; many cicada casts; moderately calcareous; carbonates occur as thin coatings on cicada casts; strongly alkaline (pH 8.6); abrupt wavy boundary.

C2ca—25 to 38 inches; light reddish brown (5YR 6/4) loamy very fine sand, reddish brown (5YR 5/4) moist; massive; very hard, friable; few very fine roots; moderately calcareous; carbonates occur as thin coatings on rock fragments; strongly alkaline (pH 9.0); clear wavy boundary.

R—38 inches; hard, fractured sandstone.

Thickness of the solum ranges from 12 to 24 inches. Depth to free carbonates ranges from 3 to 13 inches. Sandstone is at a depth of 20 to 40 inches.

The A horizon has hue of 5YR or 7.5YR, value of 5 when dry and 3 or 4 when moist, and chroma of 4 to 6 when dry and 3 or 4 when moist. It is very fine sandy loam, loamy very fine sand, or fine sandy loam. It is mildly alkaline or moderately alkaline.

The B2t horizon has hue of 5YR, value of 4 or 5 when dry or moist, and chroma of 4 to 6. It is very fine sandy loam, sandy clay loam, or fine sandy loam and is 13 to 18 percent clay. This horizon is 15 to 40 percent sand that is fine or coarser. The upper part of the B2t horizon is noncalcareous or slightly calcareous, and the lower part is slightly calcareous or moderately calcareous.

The Cca horizon has hue of 5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 4 to 6. It commonly is very fine sandy loam or fine sandy loam but is loamy fine sand in some pedons. This horizon is moderately calcareous or strongly calcareous. It is less than 5 percent pebbles.

Formation of the Soils

Soil formation in the survey area was greatly influenced by the stratigraphy and tectogenesis of the Canyon Lands section of the Colorado Plateaus province. Parent rock and geologic events that shaped the land surface influenced not only the relief and the erosion and deposition of sediment, but they also influenced climate, vegetation, and relative age of landforms *(9, 12, 19, 23, 26)*.

The climate and landscape of the survey area vary greatly; therefore, the area was separated into three geomorphic units for the discussion of soil formation. The three geomorphic units are: (1) benches, cuestas, and mesas; (2) alluvial fans and alluvial bottoms; and (3) mountains. The relationship of the factors of soil formation vary within each unit.

Benches, cuestas, and mesas. This geomorphic unit consists of a nearly horizontal, stepped sequence of benches, cuestas, and mesas that occur throughout the survey area and extend from the canyon floors to the foothills of the La Sal Mountains. These erosional landforms were carved in resistant sandstone that protected the underlying less resistant shale beds. The beds were exposed on the canyon escarpments that dissect the benches. The benches range from narrow ledges a few hundred feet wide to broad flat areas 10 miles or more in length and width. These nearly flat surfaces commonly are broken by small mesas, rock fins, and monoliths. This geomorphic unit ranges in elevation from about 4,000 feet on canyon floors to about 7,600 feet on the flanks of the La Sal and Abajo Mountains. Average annual precipitation increases from 6 inches to 16 inches with increasing elevation. Mean annual air temperature ranges from 45 to 54 degrees F. The natural plant community varies from desert shrubs and grasses on the low benches to upland grasses, shrubs, and trees on the high benches.

The soils on benches formed mainly in eolian deposits that have been eroded by wind and water. Several cycles of deposition and erosion have occurred, as evidenced by the many calcium-carbonate-rich layers present in these soils. An eolian blanket overlies these layers. The youngest soils are those that formed in recently deposited, deep sand drifts and sand dunes along the windward edge of protruding mesas, benches, and hogbacks, immediately downwind of mesas and monoliths, and at the downwind lip of air funnels. The Sheppard series on low benches and canyon floors and the Mido series on upland benches are representative of these soils, which exhibit little horizon development. Only a thin ochric epipedon has developed as a result of wetting and drying and freezing and thawing.

A metastable eolian sand blanket occupies the center part of nearly level benches and mesas. Calcium carbonate was leached from calcareous, sandy eolian material, forming a calcic horizon. The Nakai and Bluechief series are examples of soils that formed in the sand blanket on low benches, and the Mivida and Sazi series are examples of these soils on intermediate and high benches.

In shallow depressional areas and on high benches, where more leaching occurred as a result of water from run-in or higher precipitation, illuvial clay has accumulated to form an argillic horizon above the calcic horizon. The soils in the Cataract series are on low benches and canyon floors and have an argillic horizon. On the high and intermediate benches, the deep soils of the Barx series and the moderately deep soils of the Windwhistle series are examples of those that have an argillic horizon and formed in sandy eolian deposits. The eolian blanket commonly is thickest near the center of the bench or downwind of sand drifts and is thinnest on windswept bench rims, near drainageways, and on anticline dip slopes. The soils of the Mido, Mivida, Sazi, and Rizno series, on intermediate benches, are examples of those that formed in a sand blanket of varying thickness.

The dominant natural vegetation on the metastable eolian blanket is shadscale, galleta, and Indian ricegrass on low benches; Indian ricegrass, needleandthread, fourwing saltbush, and Mormon-tea on intermediate benches; and muttongrass, blue grama, and Wyoming big sagebrush on high benches. The

production of vegetation ranges from about 450 pounds per acre on low benches to 1,000 pounds per acre on high benches, with a corresponding increase of less than 1 percent organic matter to 3 percent organic matter in the surface layer.

The oldest soils in this geomorphic unit have a thick calcic horizon or a petrocalcic horizon. These soils are of early Pleistocene age and are on mesa remnants. Examples are soils of the Newsrock and Factory series.

Alluvial fans and alluvial bottoms. This geomorphic unit consists of landforms that resulted from transportation and deposition of material by running water. Included in this unit are recent alluvial bottoms and stream terraces along rivers and major drainageways (fig. 6), strath terraces and alluvial fans at the toe of canyon escarpments, and glacial outwash fans and valley fill areas that flank the La Sal Mountains. Most of the sediment deposited in these areas is silty and sandy and generally is stratified. Soils on the river bottoms and terraces are young and support varied plant communities. Typic Ustifluvents formed in the sediment on flood plains, and they support mostly inland saltgrass, alkali sacaton, saltcedar, and Fremont cottonwood. Ustic Torrifluvents developed on higher, adjacent terraces, and they support basin big sagebrush, basin wildrye, and western wheatgrass or black greasewood, seepweed, galleta, and alkali sacaton. Near the river channel, but 100 to 500 feet above the present water level, much older soils developed on the gravelly strath terraces. Remnants of river alluvium deposited during the Pleistocene are on these terraces. The Moab soils that formed on these relict, high terraces have a well developed calcic horizon.

Local stream gradient and the source of the parent material influenced the particle size of recent alluvial deposits along tributary drainageways. The loam and clay loam Barnum and Jocity soils are along drainageways in areas of shale outcroppings. Sandstone and eolian sand were the major sources of the alluvial material in which the sandy loam Redbank and Thoroughfare soils formed. The Trail soils formed in sand transported mostly from local eolian deposits. These soils are young and exhibit little if any development of genetic horizons. They are stratified as a result of successive periods of deposition, which occurred during intense thunderstorms in summer. These soils have an irregular decrease in organic matter with increasing depth.

The Nepalto soils formed in sandy-skeletal alluvial material deposited on alluvial fans at the toe of talus cones along canyon escarpments. Stones and boulders from the cliff face are common in these soils. These soils support mainly shadscale, bud sagebrush, galleta, and Indian ricegrass.

During the Pleistocene gravelly and cobbly alluvium was deposited on fans and valley floors that surround the glaciated La Sal Mountains. The rock fragments in the alluvium are diorite and monzonite.

The Bluehon soils formed in alluvium on fans and have a petrocalcic horizon. A thick calcic horizon has developed in the Strych and Moab soils that formed in younger deposits of alluvium in the lower lying areas of valleys. The Bluehon soils range in elevation from about 6,200 to 7,000 feet and support Mormon tea. These soils receive 12 to 14 inches of precipitation annually. The Moab soils range in elevation from 4,400 to 6,000 feet and support blackbrush, galleta, and Indian ricegrass. These soils receive 9 to 12 inches of precipitation annually.

Mountains. This geomorphic unit consists of glacial outwash fans, moraines, valley trains, cirque basins, landslide areas, mountainsides, and structural benches of the La Sal Mountains. Laccolithic intrusion and upwarp of nearly horizontal sedimentary strata and the glacial processes and deposition of material transported by running water shaped these landforms. Elevation ranges from about 7,600 to 12,800 feet. Average annual precipitation increases with increasing elevation; it ranges from 16 inches at the lower elevations on foothills to 40 inches near timberline on mountain peaks. Mean annual temperature ranges from 30 to 45 degrees F. The natural plant community ranges from mountain shrubs and ponderosa pine on foothills to conifer forest and subalpine meadow on high mountainsides.

Soil development on outwash fans depends on the age of the deposit and climate. Early Pleistocene fans generally extend farther from the mountain than do mid and late Pleistocene fan deposits.

The Hangdo and Harpole soils have a well developed argillic horizon. Diorite pebbles in the argillic horizon of the Harpole soils and the lower part of the argillic horizon in the Hangdo soils have thick weathering rinds, and many of the rock fragments can be crushed by hand. This extensive weathering is correlated with soils that developed in early Pleistocene deposits. The upper part of the argillic horizon and the surface layer of the Hangdo soils formed in recent eolian material and slopewash. The Hangdo soils are on leeward shoulders of dissected fan remnants, on ballenas, and in depressional areas of fan crests. Fanhead trenches bypassed runoff from on-fan drainageways and allowed eolian material to fill the shallow channels.

Figure 6.—Alluvial bottoms and stream terraces near the confluence of the Dolores and Colorado Rivers.

These soils are at elevations of 7,400 to 8,200 feet and receive 16 to 20 inches of precipitation annually. The natural plant community consists of Gambel oak, Wyoming big sagebrush, muttongrass, and Nevada bluegrass.

The Toone and Flygare soils developed on outwash fans of early or mid Pleistocene age. These soils are at higher elevations, receive more precipitation, and have cooler temperatures than do the Hangdo and Harpole soils. Elevation ranges from 8,400 to 10,000 feet, average annual precipitation is 20 to 30 inches, and mean annual air temperature is 32 to 44 degrees F. These soils have a thick mollic epipedon and a well developed argillic horizon that extends to a depth of more than 40 inches. The Flygare soils have an eluvial horizon above the argillic horizon. These soils were under coniferous forest during part of their development. The present natural plant community is quaking aspen, aspen peavine, and snowberry. The potential natural plant community is coniferous forest. The natural plant community on the Toone soils is Gambel oak, Utah serviceberry, and bluegrass.

Outwash fans overlying shale are deeply incised by drainageways that flow from the mountains. Landslides and solifluction lobes are common in drainageways and on steep side slopes. The fine-textured Herm and Iles soils formed in landslide material and solifluctate deposits derived from shale. The natural vegetation on these soils is mainly big sagebrush, muttongrass, and Gambel oak.

On high, north-facing mountainsides, from about 7,400 feet in elevation to timberline at about 11,000 feet, the Namon and Leighcan soils formed under coniferous forest. Engelmann spruce and subalpine fir make up the natural plant community and have influenced the development of a slightly acid to medium acid eluvial surface layer in these soils. The Leighcan soils formed in late Pleistocene till on valley trains and steep side slopes of lateral moraines and *U*-shaped valleys. The Namon soils formed in mid-Pleistocene till

on lateral and terminal moraines. The Broad Canyon soils are on the warmer and drier south-facing slopes at the same elevation. They support quaking aspen.

The Meredith soils are in high cirque basins. The fine earth fraction in the solum consists of eolian material, and it blankets rubble fields and rock glaciers. Pocket gophers played an active role in mixing and transporting the surface layer. Because of the short growing season, sedges, alpine clover, and cinquefoil are the dominant plants on these slopes.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial. Pertaining to material or processes associated with transportation or deposition by running water.

Alluvium. Unconsolidated material, such as sand, silt, or clay, deposited on land by running water.

Animal-unit-month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Basin. A broad structural lowland, commonly elongated and many miles across, between mountain ranges.

Basin floor. The nearly level to gently sloping bottom surface of a basin.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep to very steep broken land at the border of an upland summit that is dissected by ravines.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium

carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Cirque. Semicircular, concave, bowllike areas that have steep faces primarily resulting from glacial ice and snow abrasion.

Clastic. Rock or sediment composed mainly of fragments derived from pre-existing rocks or minerals and moved from their place of origin.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft rock.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Creep. Slow mass movement of material down relatively steep slopes, primarily as a result of gravity, but facilitated by saturation and frost action.

Critical area. A highly erodible area that generally cannot be stabilized by ordinary conservation practices. Severe erosion or sediment damage result if the area is left untreated.

Cuesta. An asymmetrical, homoclinal ridge capped by layers of resistant rock that have slight to moderate dip.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Desert pavement. A layer of gravel or coarser fragments on a desert soil surface that was emplaced by upward movement of fragments from underlying sediment or remains after finer particles have been removed by running water or wind.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor

drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature; for example, fire that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. Synonym: scarp.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fanlette. A small, commonly undissected alluvial fan that occurs below a gully, inset fan, or ravine on piedmont slopes or in mountain valleys.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fin. A narrow, elongated rock wall. Structural fins are linear and parallel to the dip slope. Erosional fins are curvilinear remnants of entrenched stream meanders.

Fine textured soil. Sandy clay, silty clay, and clay.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluve. A linear depressional area, such as a rill, gully, arroyo, canyon, or valley, along which a

drainageway flows at some time.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (or 300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Rock material transported by glacial ice and meltwater and then deposited.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A very small valley with steep sides cut by running water and through which water ordinarily runs only after rainfall or snowmelt. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard rock. Rock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well-defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Homoclinal. Pertaining to strata that dip in one direction with a uniform angle.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons generally are called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer,

excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors of predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	Very low
0.2 to 0.4	Low
0.4 to 0.75	Moderately low
0.75 to 1.25	Moderate
1.25 to 1.75	Moderately high
1.75 to 2.5	High
More than 2.5	Very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is

allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Mass movement. Dislodgement and downslope transport of earth material as a unit under direct gravitational stress.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (end). A moraine produced at the front of an actively flowing glacier.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier.

Moraine (ground). An extensive, thin layer of till that has an undulating surface. It is composed of rock debris that has been dragged by a glacier.

Moraine (lateral). A ridgelike moraine carried on and deposited at the side of a valley glacier. It is composed mainly of rock fragments derived from valley walls.

Moraine (terminal). An end moraine that marks the farthest advance of a glacier.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For

example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. The gently sloping erosional surface at the foot of a receding hill or mountain.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to premit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	Less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	More than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an

association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the Earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevated area of land that commonly has a sharp crest and steep sides and forms an extended upland between valleys.

Rill. A steep sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saddle. A low point on a ridge or crestline that generally is a divide between the heads of streams flowing in opposite directions.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sand drift. A sandy eolian deposit leeward of a gap between two obstructions. Also the accumulation of sand above a cliff face along the windward edge of a mesa.

Sand fan. A sandy eolian deposit whose smooth surface forms a segment of a cone that radiates leeward of a gap between two obstructions and decreases in thickness downwind.

Sand shadow. An accumulation of sand in the shelter of an obstruction, such as a cliff, that interferes with airflow.

Sand sheet. A large sand deposit that has a nearly flat surface except for an occasional sand drift, dune, or blowout.

Sand trap. A small park, valley, or joint that is bounded on two sides or more by high rock walls and is partially filled with eolian sand.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling

can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Slump. The downward slipping of a mass of rock or unconsolidated material.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

Slight	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, expressed in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solifluctate. Unconsolidated material deposited by the slow downslope flow of saturated regolith.

Solifluction. The slow downslope flow of saturated regolith.

Solifluction lobe. A curved or rounded landform that is the result of solifluction.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers

that interfere with or prevent tillage.

Stream terrace. A series of platforms in a stream valley that are more or less parallel to the stream channel and originally formed near the level of the stream.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structural bench. A nearly level to gently inclined erosional surface that developed on resistant strata in areas where valleys are cut into alternating strong and weak layers.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tail water. The water just downstream of an irrigation structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep, rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Valley train. A long, narrow body of glacial outwash confined within a valley below a glacier.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Wash. The broad, flat-floored channel of an ephemeral stream. It commonly has very steep to vertical banks.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the Earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1901-84 at La Sal, Utah; elevation 6,720 feet)

Month	Temperature					Precipitation			
						Rainfall		Snowfall	
	Mean daily maximum	Mean daily minimum	Mean monthly	Extreme high	Extreme low	Mean	Daily maximum	Mean	Monthly maximum
	°F	°F	°F	°F	°F	In	In	In	In
January-----	35.8	12.7	24.3	60	-22	0.87	1.50	9.1	25.5
February----	39.9	16.8	28.4	64	-27	.88	1.22	9.5	34.0
March-------	46.8	23.2	35.0	72	-10	.86	.89	7.1	32.0
April-------	57.4	30.6	44.0	82	-1	.98	1.05	3.4	19.7
May---------	67.1	38.9	53.0	91	19	1.00	1.11	2.2	13.5
June--------	77.4	47.5	62.5	97	22	.77	1.95	.0	*
July--------	83.8	54.2	69.0	101	34	1.42	1.68	.0	*
August------	81.3	52.9	67.1	98	33	1.60	1.93	.0	.0
September---	73.8	44.5	59.2	92	18	1.22	1.70	.1	3.5
October-----	62.3	33.7	48.0	85	8	1.55	2.04	1.6	8.0
November----	48.0	23.5	35.8	75	-7	.89	1.50	5.6	20.3
December----	36.7	14.9	26.3	65	-22	1.03	2.00	13.0	55.6
Annual------	59.3	32.8	46.1	101	-22	13.07	2.04	51.6	55.6

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

(Recorded in the period 1965-84 at Canyonlands-The Needle, Utah; elevation 5,040 feet)

Month	Temperature					Precipitation			
						Rainfall		Snowfall	
	Mean daily maximum	Mean daily minimum	Mean monthly	Extreme high	Extreme low	Mean	Daily maximum	Mean	Monthly maximum
	°F	°F	°F	°F	°F	In	In	In	In
January-----	39.3	14.6	27.0	63	-16	0.52	0.76	4.4	19.8
February----	48.5	21.4	35.0	73	-5	.39	.78	1.7	11.0
March-------	57.9	28.9	43.4	80	7	.62	.85	1.6	10.0
April-------	66.7	35.2	51.0	86	12	.68	.82	.8	9.5
May---------	78.2	44.7	61.5	97	22	.59	.92	.0	*
June--------	88.9	53.8	71.4	106	33	.49	.72	.0	.0
July--------	95.3	61.6	78.5	107	41	.98	.98	.0	.0
August------	92.5	59.5	76.0	104	40	1.05	1.10	.0	.0
September---	84.4	50.0	67.2	99	29	.71	1.06	.0	.0
October-----	69.5	37.0	53.3	90	19	1.18	1.10	.3	2.5
November----	54.0	26.9	40.5	76	-4	.73	.84	1.3	3.8
December----	42.1	17.4	29.8	65	-15	.73	.86	5.8	13.0
Annual------	68.1	37.6	52.9	107	-16	8.67	1.10	15.9	19.8

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

(Recorded in the period 1963-84 at Moab, Utah; elevation 3,965 feet)

Month	Temperature					Precipitation			
	Mean daily maximum	Mean daily minimum	Mean monthly	Extreme high	Extreme low	Rainfall		Snowfall	
						Mean	Daily maximum	Mean	Monthly maximum
	°F	°F	°F	°F	°F	In	In	In	In
January-----	41.7	17.5	29.6	67	-24	0.68	1.20	4.3	28.0
February----	50.3	24.2	37.3	78	-13	.63	1.20	1.7	15.0
March-------	60.8	32.2	46.5	88	8	.82	1.08	1.0	9.0
April-------	71.8	40.3	56.1	97	15	.79	2.10	.2	11.0
May---------	80.9	48.2	64.6	102	27	.70	1.85	.02	1.5
June--------	91.8	55.5	73.7	113	36	.41	1.51	.0	.0
July--------	97.4	62.3	79.9	111	43	.75	2.77	.0	*
August------	94.5	59.8	77.2	109	40	.81	1.50	.0	.0
September---	86.1	50.8	68.5	108	28	.88	3.99	.0	.0
October-----	72.7	39.3	56.0	94	15	1.00	1.95	.04	2.0
November----	56.2	27.5	41.9	82	2	.67	1.20	.4	11.0
December----	43.9	20.2	32.1	68	-18	.79	3.30	3.2	46.0
Annual------	70.7	39.8	55.3	113	-24	8.93	3.99	10.86	46.0

* Trace.

TABLE 2.--ESTIMATED PAN EVAPORATION

Month	Canyonlands-The Needle	La Sal	Moab
	In	In	In
May	10.34	7.65	9.90
June	12.40	9.01	12.37
July	13.25	9.09	11.49
August	11.36	7.93	10.54
September	8.39	5.98	7.69
October	4.82	4.17	4.80
Total	60.56	48.83	56.70

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Grand County	San Juan County	Total-- Area	Extent
		Acres	Acres	Acres	Pct
1	Arches-Sheppard-Rock outcrop complex, 2 to 8 percent slopes	260	5,275	5,535	0.3
2	Badland	4,505	8,050	12,555	0.7
3	Barnum loam, 0 to 3 percent slopes	0	6,605	6,605	0.4
4	Barnum loam, 3 to 8 percent slopes	0	1,685	1,685	0.1
5	Barnum silty clay loam, 0 to 3 percent slopes	875	7,470	8,345	0.5
6	Barx fine sandy loam, 3 to 8 percent slopes	1,815	2,935	4,750	0.3
7	Begay fine sandy loam, 2 to 6 percent slopes	5,295	42,230	47,525	2.7
8	Begay fine sandy loam, moist, 2 to 6 percent slopes	1,540	23,495	25,035	1.4
9	Begay-Rizno complex, 3 to 15 percent slopes	0	11,375	11,375	0.6
10	Begay-Rock outcrop-Mido complex, 2 to 35 percent slopes	490	56,230	56,720	3.2
11	Bluechief fine sandy loam, 1 to 8 percent slopes	670	465	1,135	0.1
12	Bluechief-Hanksville-Leeko complex, 1 to 15 percent slopes	2,005	0	2,005	0.1
13	Bluehon stony loam, 2 to 15 percent slopes	0	5,390	5,390	0.3
14	Bond-Rizno fine sandy loams, 3 to 15 percent slopes	15,220	42,665	57,885	3.2
15	Bond-Windwhistle complex, 2 to 15 percent slopes	5,085	4,510	9,595	0.5
16	Bookcliff Variant-Beje complex, 2 to 15 percent slopes	1,955	0	1,955	0.1
17	Broad Canyon very cobbly loam, 50 to 70 percent slopes	4,895	2,320	7,215	0.4
18	Broad Canyon very stony loam, 50 to 70 percent slopes	595	1,200	1,795	0.1
19	Cahona fine sandy loam, 2 to 8 percent slopes	3,580	28,845	32,425	1.8
20	Cataract loamy fine sand, 2 to 8 percent slopes	0	2,500	2,500	0.1
21	Dranyon-Tolman Variant complex, 8 to 20 percent slopes	2,900	1,935	4,835	0.3
22	Dumps-Pits complex	0	350	350	*
23	Factory gravelly fine sandy loam, 2 to 6 percent slopes	25	2,480	2,505	0.1
24	Falcon fine sandy loam, 8 to 15 percent slopes	925	4,920	5,845	0.3
25	Falcon gravelly sandy loam, 25 to 65 percent slopes	735	845	1,580	0.1
26	Falcon-Bond-Rock outcrop complex, 2 to 15 percent slopes	245	4,270	4,515	0.3
27	Falcon-Bond-Rock outcrop complex, 15 to 70 percent slopes	6,270	2,790	9,060	0.5
28	Flygare loam, 5 to 25 percent slopes	1,940	4,480	6,420	0.4
29	Flygare loam, 25 to 50 percent slopes	2,460	8,945	11,405	0.6
30	Frolic loam, 2 to 6 percent slopes	410	1,050	1,460	0.1
31	Fughes loam, 4 to 10 percent slopes	480	2,425	2,905	0.2
32	Gullied land	1,450	0	1,450	0.1
33	Hagerman very fine sandy loam, 2 to 8 percent slopes	0	7,695	7,695	0.4
34	Hangdo loam, 3 to 15 percent slopes	0	925	925	0.1
35	Hangdo cobbly loam, 3 to 25 percent slopes	0	620	620	*
36	Harpole very cobbly loam, 25 to 60 percent slopes	1,165	3,635	4,800	0.3
37	Herm clay loam, 8 to 20 percent slopes	0	1,730	1,730	0.1
38	Herm-Iles stony loams, 3 to 25 percent slopes	8,865	9,145	18,010	1.0
39	Herm-Tomasaki-Falcon complex, 25 to 65 percent slopes	5,365	12,605	17,970	1.0
40	Hoskinnini very gravelly fine sandy loam, 0 to 8 percent slopes	0	3,250	3,250	0.2
41	Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes	40	29,700	29,740	1.7
42	Ignacio-Leanto fine sandy loams, dry, 2 to 6 percent slopes	0	7,965	7,965	0.4
43	Jocity loam, 2 to 4 percent slopes	1,125	0	1,125	0.1
44	Kilfoil Variant-Hangdo-Harpole Variant complex, 3 to 25 percent slopes	565	4,560	5,125	0.3
45	Leighcan cobbly loam, 25 to 50 percent slopes	930	1,760	2,690	0.2
46	Leighcan cobbly loam, 50 to 70 percent slopes	5,610	4,055	9,665	0.5
47	Lithic Torriorthents-Badland-Rock outcrop complex, 15 to 30 percent slopes	3,820	0	3,820	0.2
48	Lithic Ustic Torriorthents-Badland-Rock outcrop complex, 15 to 30 percent slopes	3,330	140	3,470	0.2
49	Meredith stony loam, 20 to 70 percent slopes	1,405	895	2,300	0.1
50	Mido loamy fine sand, 2 to 8 percent slopes	0	2,565	2,565	0.1
51	Mido loamy fine sand, dry, 2 to 8 percent slopes	1,600	33,905	35,505	2.0
52	Mivida fine sandy loam, 2 to 8 percent slopes	360	8,475	8,835	0.5
53	Moab gravelly fine sandy loam, 2 to 8 percent slopes	4,175	4,145	8,320	0.5
54	Moab very cobbly fine sandy loam, 3 to 30 percent slopes	8,930	4,220	13,150	0.7
55	Moab-Rizno gravelly fine sandy loams, 2 to 15 percent slopes	1,060	0	1,060	0.1
56	Moenkopie very gravelly sandy loam, 3 to 30 percent slopes	6,175	3,250	9,425	0.5
57	Moenkopie-Rock outcrop complex, 1 to 15 percent slopes	2,690	44,670	47,360	2.7
58	Nakai fine sand, 2 to 8 percent slopes	535	7,080	7,615	0.4

See footnote at end of table.

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Grand County	San Juan County	Total-- Area	Extent
		Acres	Acres	Acres	Pct
59	Namon gravelly loam, 8 to 30 percent slopes	430	2,395	2,825	0.2
60	Namon gravelly loam, 30 to 50 percent slopes	555	2,615	3,170	0.2
61	Nepalto gravelly sandy loam, 2 to 8 percent slopes	80	2,650	2,730	0.2
62	Nepalto very stony sandy loam, 2 to 8 percent slopes	1,310	960	2,270	0.1
63	Newsrock loamy fine sand, 1 to 3 percent slopes	630	4,040	4,670	0.3
64	Redbank fine sandy loam, 0 to 3 percent slopes	1,120	60	1,180	0.1
65	Redbank fine sandy loam, 3 to 8 percent slopes	695	135	830	*
66	Redbank fine sandy loam, dry, 0 to 3 percent slopes	230	11,870	12,100	0.7
67	Redbank fine sandy loam, dry, 3 to 8 percent slopes	1,515	5,190	6,705	0.4
68	Redbank very fine sandy loam, 0 to 3 percent slopes	235	4,755	4,990	0.3
69	Richens-Herd complex, 3 to 15 percent slopes	360	610	970	0.1
70	Rizno-Rock outcrop complex, 3 to 15 percent slopes	31,490	90,505	121,995	6.7
71	Rizno, dry-Rock outcrop complex, 3 to 15 percent slopes	64,695	49,845	114,540	6.3
72	Rock outcrop	28,745	124,800	153,545	8.5
73	Rock outcrop-Moenkopie complex, 3 to 15 percent slopes	2,305	82,485	84,790	4.8
74	Rock outcrop-Rizno complex, 3 to 15 percent slopes	10,805	87,125	97,930	5.5
75	Rock outcrop-Rizno, dry complex, 3 to 15 percent slopes	47,395	94,295	141,690	7.9
76	Rock outcrop-Ustic Torripsamments complex, 2 to 15 percent slopes	4,985	9,005	13,990	0.8
77	Rubble land	5,490	5,020	10,510	0.6
78	Sedillo very stony fine sandy loam, 3 to 15 percent slopes	2,335	3,335	5,670	0.3
79	Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes	0	12,675	12,675	0.7
80	Sheppard fine sand, 2 to 8 percent slopes	1,585	7,465	9,050	0.5
81	Sirref loam, 4 to 8 percent slopes	1,900	2,015	3,915	0.2
82	Sirref-Toone loams, 4 to 10 percent slopes	3,795	205	4,000	0.2
83	Skylick loam, 5 to 30 percent slopes	3,215	7,145	10,360	0.6
84	Slickens	0	410	410	*
85	Strych very cobbly fine sandy loam, 8 to 30 percent slopes	1,090	4,555	5,645	0.3
86	Strych very cobbly fine sandy loam, 30 to 60 percent slopes	1,430	810	2,240	0.1
87	Strych very cobbly fine sandy loam, dry, 8 to 15 percent slopes	4,785	0	4,785	0.3
88	Thoroughfare fine sandy loam, 2 to 8 percent slopes	3,845	10,260	14,105	0.8
89	Thoroughfare loam, 0 to 3 percent slopes	2,650	825	3,475	0.2
90	Tolman Variant loam, 3 to 10 percent slopes	2,145	0	2,145	0.1
91	Tomasaki loam, 3 to 15 percent slopes	510	2,425	2,935	0.2
92	Tomasaki loam, 15 to 25 percent slopes	0	1,060	1,060	0.1
93	Toone loam, 8 to 20 percent slopes	5,005	1,740	6,745	0.4
94	Toone-Sirref-Herm complex, 10 to 30 percent slopes	8,480	1,845	10,325	0.6
95	Trail fine sand, 0 to 5 percent slopes	1,215	1,890	3,105	0.2
96	Tukuhnik loam, 3 to 10 percent slopes	1,075	4,575	5,650	0.3
97	Ustic Torrifluvents-Ustic Torrifluvents, sodic-Typic Ustifluvents complex, 0 to 6 percent slopes	6,280	6,840	13,120	0.7
98	Ustic Torriorthents, warm, 10 to 50 percent slopes	6,530	0	6,530	0.4
99	Ustic Torriorthents-Lithic Torriorthents, warm-Rock outcrop complex, 10 to 80 percent slopes	41,115	113,180	154,295	8.7
100	Ustic Torriorthents-Ustollic Calciorthids complex, 10 to 60 percent slopes	820	48,255	49,075	2.8
101	Ustic Torriorthents-Ustollic Haplargids complex, 10 to 60 percent slopes	2,790	26,950	29,740	1.7
102	Waas very fine sandy loam, 2 to 8 percent slopes	1,355	7,500	8,855	0.5
103	Windwhistle very fine sandy loam, 1 to 6 percent slopes	1,565	10,005	11,570	0.6
104	Windwhistle-Sazi very fine sandy loams, 1 to 3 percent slopes	0	6,730	6,730	0.4
	Water	210	3,545	3,755	0.2
	Total	433,165	1,349,325	1,782,490	100.0

* Less than 0.1 percent.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

(Only the soils that support vegetation suitable for grazing are listed)

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
1*:					
Arches	Desert Shallow Sand (Blackbrush)	Favorable	400	Blackbrush	30
		Normal	250	Indian ricegrass	10
		Unfavorable	150	Dropseed	10
				Mormon tea	10
				Galleta	5
Sheppard	Desert Sand	Favorable	700	Indian ricegrass	30
		Normal	400	Sand dropseed	10
		Unfavorable	200	Sand sagebrush	10
				Sandhill muhly	5
				Globemallow	5
				Fourwing saltbush	5
				Mormon tea	5
				Finebranched eriogonum	5
Rock outcrop.					
3 Barnum	Loamy Bottom	Favorable	2,000	Blue grama	15
		Normal	1,600	Basin big sagebrush	15
		Unfavorable	1,000	Western wheatgrass	10
				Rubber rabbitbrush	10
				Needleandthread	5
				Muttongrass	5
				Bottlebrush squirreltail	5
				Indian ricegrass	5
				Fourwing saltbush	5
4 Barnum	Semidesert Loam	Favorable	800	Wyoming big sagebrush	20
		Normal	600	Indian ricegrass	15
		Unfavorable	400	Galleta	10
				Bottlebrush squirreltail	10
				Winterfat	10
				Needleandthread	5
				Globemallow	5
				Douglas rabbitbrush	5
5 Barnum	Alkali Flat	Favorable	1,000	Black greasewood	30
		Normal	750	Bottlebrush squirreltail	20
		Unfavorable	500	Alkali sacaton	10
				Galleta	5
				Seepweed	5
6 Barx	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
7 Begay	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5
8 Begay	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
9*:					
Begay	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
Rizno	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5
10*:					
Begay	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5
Rock outcrop.					
Mido	Semidesert Sand	Favorable	800	Indian ricegrass	20
		Normal	600	Needleandthread	10
		Unfavorable	300	Fourwing saltbush	10
				Dropseed	5
				Sandhill muhly	5
				Munro globemallow	5
				Mormon tea	5
				Sand sagebrush	5
				Finebranched eriogonum	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
11 Bluechief	Desert Sandy Loam	Favorable	550	Indian ricegrass	35
		Normal	450	Galleta	15
		Unfavorable	300	Dropseed	10
				Fourwing saltbush	10
				Globemallow	5
				Winterfat	5
12*:					
Bluechief	Desert Sandy Loam	Favorable	550	Indian ricegrass	35
		Normal	450	Galleta	15
		Unfavorable	300	Dropseed	10
				Fourwing saltbush	10
				Globemallow	5
				Mormon tea	5
				Winterfat	5
Hanksville	Desert Clay (Shadscale)	Favorable	400	Shadscale	30
		Normal	300	Bottlebrush squirreltail	20
		Unfavorable	180	Salina wildrye	10
				Winterfat	10
				Bud sagebrush	10
				Indian ricegrass	5
				Other perennial grasses	5
				Other perennial forbs	5
				Other shrubs	5
Leeko	Alkali Flat	Favorable	1,000	Black greasewood	30
		Normal	750	Bottlebrush squirreltail	20
		Unfavorable	500	Alkali sacaton	10
				Galleta	5
				Seepweed	5
13 Bluehon	Upland Stony Loam (Pinyon-Utah Juniper)	Favorable	1,000	Green Mormon tea	10
		Normal	700	Rock goldenrod	10
		Unfavorable	500	Nevada bluegrass	8
				Muttongrass	8
				Blue grama	5
				Prairie junegrass	5
				Pinyon	5
14*:					
Bond	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
14*:					
Rizno	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5
15*:					
Bond	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5
Windwhistle	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
16*:					
Bookcliff Variant	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
Beje	Mountain Shallow Loam (Mountain Big Sagebrush)	Favorable	1,500	Mountain big sagebrush	20
		Normal	1,200	Bluegrass	10
		Unfavorable	850	Slender wheatgrass	10
				Saline wildrye	10
				Letterman needlegrass	5
				Needleandthread	5
				Prairie junegrass	5
				Snowberry	5
17 Broad Canyon	High Mountain Very Steep Loam (Aspen)	Favorable	1,400	Wheatgrass	15
		Normal	1,000	Needlegrass	10
		Unfavorable	700	Brome	10
				Blue wildrye	10
				Quaking aspen	10
				Bluegrass	5
				Snowberry	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
18: Broad Canyon	High Mountain Loam (Thurber Fescue)	Favorable	3,000	Thurber fescue	25
		Normal	2,500	Mountain brome	10
		Unfavorable	2,000	Slender wheatgrass	10
				Sedge	5
				Aspen peavine	5
				Western yarrow	5
				Lupine	5
				Mountain big sagebrush	5
				Snowberry	5
19: Cahona	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
20: Cataract	Desert Sandy Loam (Blackbrush)	Favorable	500	Blackbrush	25
		Normal	450	Indian ricegrass	20
		Unfavorable	350	Galleta	15
				Cutler Mormon tea	10
				Spike dropseed	5
				Broom snakeweed	5
21*:					
Dranyon	High Mountain Loam (Aspen)	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Quaking aspen	10
				Bluegrass	5
Tolman Variant	Mountain Shallow Loam (Ponderosa Pine)	Favorable	1,000	Greenleaf manzanita	25
		Normal	700	Gambel oak	10
		Unfavorable	400	Bottlebrush squirreltail	5
				Elk sedge	5
				Muttongrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
23: Factory	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
24, 25: Falcon	Mountain Shallow Loam (Ponderosa Pine)	Favorable	1,000	Greenleaf manzanita	25
		Normal	700	Gambel oak	10
		Unfavorable	400	Bottlebrush squirreltail	5
				Elk sedge	5
				Muttongrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
26*:					
Falcon	Mountain Shallow Loam (Ponderosa Pine)	Favorable	1,000	Greenleaf manzanita	25
		Normal	700	Gambel oak	10
		Unfavorable	400	Bottlebrush squirreltail	5
				Elk sedge	5
				Muttongrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
Bond	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5
Rock outcrop.					
27*:					
Falcon	Mountain Shallow Loam (Ponderosa Pine)	Favorable	1,000	Greenleaf manzanita	25
		Normal	700	Gambel oak	10
		Unfavorable	400	Bottlebrush squirreltail	5
				Elk sedge	5
				Muttongrass	5
				Prairie junegrass	5
				Serviceberry	5
				True mountainmahogany	5
Bond	Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Nevada bluegrass	10
		Normal	400	Indian ricegrass	7
		Unfavorable	300	Muttongrass	7
				Bottlebrush squirreltail	7
				Needleandthread	5
				Blue grama	5
				Birchleaf mountainmahogany	5
				Black sagebrush	5
Rock outcrop.					

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
28, 29: Flygare	High Mountain Stony Loam (Aspen)	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Quaking aspen	10
				Bluegrass	5
30: Frolic	Mountain Loam	Favorable	1,800	Bluegrass	15
		Normal	1,400	Mountain big sagebrush	15
		Unfavorable	1,000	Wheatgrass	10
				Needleandthread	10
				Letterman needlegrass	5
				Brome	5
				Snowberry	5
31: Fughes	Mountain Loam	Favorable	1,800	Bluegrass	15
		Normal	1,400	Mountain big sagebrush	15
		Unfavorable	1,000	Wheatgrass	10
				Needleandthread	10
				Letterman needlegrass	5
				Brome	5
				Snowberry	5
33: Hagerman	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
34, 35: Hangdo	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Mountain big sagebrush	5
				Serviceberry	5
36: Harpole	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
37: Herm	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
38*:					
Herm	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
Iles	Mountain Loam	Favorable	1,800	Bluegrass	15
		Normal	1,400	Mountain big sagebrush	15
		Unfavorable	1,000	Wheatgrass	10
				Needleandthread	10
				Letterman needlegrass	5
				Brome	5
				Snowberry	5
39*:					
Herm	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
Tomasaki	Mountain Loam (Ponderosa Pine)	Favorable	1,500	Gambel oak	15
		Normal	1,100	Muttongrass	10
		Unfavorable	700	Elk sedge	10
				Bottlebrush squirreltail	5
				Needleandthread	5
				Prairie junegrass	5
				Snowberry	5
				Oregongrape	5
Falcon	Mountain Shallow Loam (Ponderosa Pine)	Favorable	1,000	Greenleaf manzanita	25
		Normal	700	Gambel oak	10
		Unfavorable	400	Bottlebrush squirreltail	5
				Elk sedge	5
				Muttongrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
40 Hoskinnini	Desert Shallow Sandy Loam	Favorable	350	Galleta	20
		Normal	250	Indian ricegrass	15
		Unfavorable	100	Shadscale	15
				Sand dropseed	5
				Blackbrush	5
				Mormon tea	5
				Winterfat	5
41*:					
Ignacio	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
41*:					
Leanto	Upland Shallow Loam	Favorable	1,000	Black sagebrush	10
		Normal	750	Nevada bluegrass	8
		Unfavorable	500	Birchleaf mountainmahogany	8
				Blue grama	5
				Indian ricegrass	5
				Muttongrass	5
				Prairie junegrass	5
				Globemallow	5
				Gambel oak	5
42*:					
Ignacio	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5
Leanto	Semidesert Shallow Sandy Loam	Favorable	500	Galleta	20
		Normal	300	Shadscale	15
		Unfavorable	100	Indian ricegrass	10
				Bigelow sagebrush	10
				Needleandthread	5
				Mormon tea	5
				Broom snakeweed	5
43 Jocity	Loamy Bottom	Favorable	2,000	Blue grama	15
		Normal	1,600	Basin big sagebrush	15
		Unfavorable	1,000	Western wheatgrass	10
				Rubber rabbitbrush	10
				Needleandthread	5
				Muttongrass	5
				Bottlebrush squirreltail	5
				Indian ricegrass	5
				Fourwing saltbush	5
44*:					
Kilfoil Variant	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
Hangdo	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Mountain big sagebrush	5
				Serviceberry	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
44*: Harpole Variant	Mountain Stony Loam	Favorable	1,000	Mountain big sagebrush	15
		Normal	700	Muttongrass	10
		Unfavorable	400	Needleandthread	10
				Blue grama	5
				Brome	5
				Wheatgrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
45 Leighcan	High Mountain Stony Loam (Engelmann Spruce)	Favorable	110	Vaccinium	50
		Normal	100	Oregongrape	15
		Unfavorable	90	Sedge	10
				Pinegrass	10
				Gooseberry	10
46 Leighcan	High Mountain Very Steep Stony Loam (Engelmann Spruce)	Favorable	100	Vaccinium	50
		Normal	75	Oregongrape	15
		Unfavorable	50	Sedge	10
				Pinegrass	10
				Gooseberry	10
47*: Lithic Torriorthents	Desert Shallow Sandy Loam	Favorable	350	Galleta	20
		Normal	250	Indian ricegrass	15
		Unfavorable	100	Shadscale	15
				Sand dropseed	5
				Blackbrush	5
				Mormon tea	5
				Winterfat	5
Badland.					
Rock outcrop.					
48*: Lithic Ustic Torriorthents	Semidesert Shallow Sandy Loam (Blackbrush)	Favorable	500	Blackbrush	65
		Normal	350	Indian ricegrass	5
		Unfavorable	200	Galleta	5
				Torrey Mormon tea	5
				Bigelow sagebrush	5
Badland.					
Rock outcrop.					
49 Meredith	Alpine Slope	Favorable	2,000	Bellard alpinesedge	15
		Normal	1,500	Sedge	10
		Unfavorable	1,200	Willow	10
				Alpine bluegrass	5
				Tufted hairgrass	5
				Wheatgrass	5
				Alpine clover	5
				American bistort	5
				Western yarrow	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
50: Mido	Upland Sand	Favorable	1,500	Dropseed	15
		Normal	1,000	Blue grama	10
		Unfavorable	700	Indian ricegrass	10
				Needleandthread	10
				Mormon tea	10
				Winterfat	5
51: Mido	Semidesert Sand	Favorable	800	Indian ricegrass	20
		Normal	600	Needleandthread	10
		Unfavorable	300	Fourwing saltbush	10
				Dropseed	5
				Sandhill muhly	5
				Munro globemallow	5
				Mormon tea	5
				Sand sagebrush	5
				Finebranched eriogonum	5
52: Mivida	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5
53, 54: Moab	Semidesert Stony Loam (Blackbrush)	Favorable	750	Blackbrush	35
		Normal	500	Galleta	20
		Unfavorable	300	Indian ricegrass	15
				Mormon tea	5
55*:					
Moab	Semidesert Stony Loam (Blackbrush)	Favorable	750	Blackbrush	35
		Normal	500	Galleta	20
		Unfavorable	300	Indian ricegrass	15
				Mormon tea	5
Rizno	Semidesert Shallow Sandy Loam (Utah Juniper-Pinyon)	Favorable	400	Blackbrush	35
		Normal	350	Mormon tea	10
		Unfavorable	250	Galleta	5
				Indian ricegrass	5
				Utah juniper	5
56: Moenkopie	Desert Shallow Sandy Loam (Blackbrush)	Favorable	350	Blackbrush	55
		Normal	200	Galleta	10
		Unfavorable	100	Indian ricegrass	5
				Shadscale	5
				Mormon tea	5
				Broom snakeweed	5
57*:					
Moenkopie	Desert Shallow Sandy Loam (Blackbrush)	Favorable	350	Blackbrush	55
		Normal	200	Galleta	10
		Unfavorable	100	Indian ricegrass	5
				Shadscale	5
				Mormon tea	5
				Broom snakeweed	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
57*: Rock outcrop.					
58 Nakai	Desert Sandy Loam	Favorable	550	Indian ricegrass	35
		Normal	450	Galleta	15
		Unfavorable	300	Dropseed	10
				Fourwing saltbush	10
				Globemallow	5
				Mormon tea	5
				Winterfat	5
59, 60 Namon	High Mountain Stony Loam (Engelmann Spruce)	Favorable	110	Blueberry	50
		Normal	100	Oregongrape	15
		Unfavorable	90	Sedge	10
				Pinegrass	10
				Currant	10
61, 62 Nepalto	Desert Stony Loam (Blackbrush)	Favorable	500	Blackbrush	35
		Normal	300	Galleta	15
		Unfavorable	200	Shadscale	5
				Torrey Mormon tea	5
				Fourwing saltbush	5
				Broom snakeweed	5
63 Newsrock	Semidesert Sandy Loam (Blackbrush)	Favorable	700	Indian ricegrass	20
		Normal	500	Galleta	15
		Unfavorable	300	Blackbrush	15
				Cutler Mormon tea	10
				Sand dropseed	5
				Fourwing saltbush	5
				Broom snakeweed	5
64, 65 Redbank	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
66, 67 Redbank	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5
68 Redbank	Alkali Flat	Favorable	1,000	Black greasewood	30
		Normal	750	Bottlebrush squirreltail	20
		Unfavorable	500	Alkali sacaton	10
				Galleta	5
				Seepweed	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
69*:					
Richens	High Mountain Clay	Favorable	2,300	Wheatgrass	15
		Normal	1,600	Columbia needlegrass	10
		Unfavorable	1,200	Brome	10
				Bluegrass	10
				Blue wildrye	5
				Snowberry	5
				Mountain big sagebrush	5
Herd	High Mountain Loam (Thurber Fescue)	Favorable	3,000	Thurber fescue	25
		Normal	2,500	Mountain brome	10
		Unfavorable	2,000	Slender wheatgrass	10
				Sedge	5
				Aspen peavine	5
				Western yarrow	5
				Lupine	5
				Mountain big sagebrush	5
				Snowberry	5
70*:					
Rizno	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5
Rock outcrop.					
71*:					
Rizno	Semidesert Shallow Sandy Loam (Utah Juniper-Pinyon)	Favorable	400	Blackbrush	35
		Normal	350	Mormon tea	10
		Unfavorable	250	Galleta	5
				Indian ricegrass	5
				Utah juniper	5
Rock outcrop.					
73*:					
Rock outcrop.					
Moenkopie	Desert Shallow Sandy Loam (Blackbrush)	Favorable	350	Blackbrush	55
		Normal	200	Galleta	10
		Unfavorable	100	Indian ricegrass	5
				Shadscale	5
				Mormon tea	5
				Broom snakeweed	5
74*:					
Rock outcrop.					

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
74*:					
Rizno	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5
75*:					
Rock outcrop.					
Rizno	Semidesert Shallow Sandy Loam (Utah Juniper-Pinyon)	Favorable	400	Blackbrush	35
		Normal	350	Mormon tea	10
		Unfavorable	250	Galleta	5
				Indian ricegrass	5
				Utah juniper	5
76*:					
Rock outcrop.					
Ustic Torripsamments	Semidesert Sand	Favorable	800	Indian ricegrass	20
		Normal	600	Needleandthread	10
		Unfavorable	300	Fourwing saltbush	10
				Dropseed	5
				Sandhill muhly	5
				Munro globemallow	5
				Mormon tea	5
				Sand sagebrush	5
				Finebranched eriogonum	5
78 Sedillo	Upland Stony Loam	Favorable	1,500	Muttongrass	10
		Normal	1,100	Nevada bluegrass	10
		Unfavorable	700	Wyoming big sagebrush	10
				Needleandthread	5
				Prairie junegrass	5
				Blue grama	5
				Birchleaf mountainmahogany	5
				Green Mormon tea	5
79*:					
Shalako	Upland Shallow Loam (Pinyon-Utah Juniper)	Favorable	600	Bigelow sagebrush	20
		Normal	400	Mormon tea	15
		Unfavorable	100	Galleta	5
				Indian ricegrass	5
				Bluegrass	5
				Fine Douglas rabbitbrush	5
				Mexican cliffrose	5
				Roundleaf buffaloberry	5
				Pricklypear	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
79*:					
Anasazi	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
Rock outcrop.					
80 Sheppard	Desert Sand	Favorable	700	Indian ricegrass	30
		Normal	400	Sand dropseed	10
		Unfavorable	200	Sand sagebrush	10
				Sandhill muhly	5
				Globemallow	5
				Fourwing saltbush	5
				Mormon tea	5
				Finebranched eriogonum	5
81 Sirref	Mountain Stony Loam	Favorable	1,000	Mountain big sagebrush	15
		Normal	700	Muttongrass	10
		Unfavorable	400	Needleandthread	10
				Blue grama	5
				Brome	5
				Wheatgrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
82*:					
Sirref	Mountain Stony Loam	Favorable	1,000	Mountain big sagebrush	15
		Normal	700	Muttongrass	10
		Unfavorable	400	Needleandthread	10
				Blue grama	5
				Brome	5
				Wheatgrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
Toone	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
83 Skylick	High Mountain Loam (Aspen)	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Quaking aspen	10
				Bluegrass	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
85 Strych	Upland Stony Loam (Pinyon-Utah Juniper)	Favorable	1,000	Green Mormon tea	10
		Normal	700	Rock goldenrod	10
		Unfavorable	500	Nevada bluegrass	8
				Muttongrass	8
				Blue grama	5
				Prairie junegrass	5
				Pinyon	5
86 Strych	Upland Very Steep Stony Loam (Pinyon-Utah Juniper)	Favorable	600	Nevada bluegrass	10
		Normal	400	Indian ricegrass	7
		Unfavorable	300	Muttongrass	7
				Bottlebrush squirrel	7
				Blue grama	5
				Needleandthread	5
				Birchleaf mountainmahogany	5
				Black sagebrush	5
87 Strych	Semidesert Gravelly Loam (Utah Juniper-Pinyon)	Favorable	800	Fourwing saltbush	15
		Normal	550	Galleta	10
		Unfavorable	400	Mormon tea	10
				Blue grama	5
				Indian ricegrass	5
				Needleandthread	5
88 Thoroughfare	Desert Sandy Loam	Favorable	550	Indian ricegrass	35
		Normal	450	Galleta	15
		Unfavorable	300	Dropseed	10
				Fourwing saltbush	10
				Globemallow	5
				Mormon tea	5
				Winterfat	5
89 Thoroughfare	Alkali Flat	Favorable	1,000	Black greasewood	30
		Normal	750	Bottlebrush squirreltail	20
		Unfavorable	500	Alkali sacaton	10
				Galleta	5
				Seepweed	5
90 Tolman Variant	Mountain Shallow Loam (Ponderosa Pine)	Favorable	1,000	Greenleaf manzanita	25
		Normal	700	Gambel oak	10
		Unfavorable	400	Bottlebrush squirreltail	5
				Elk sedge	5
				Muttongrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
91, 92 Tomasaki	Mountain Loam (Ponderosa Pine)	Favorable	1,500	Gambel oak	15
		Normal	1,100	Muttongrass	10
		Unfavorable	700	Elk sedge	10
				Bottlebrush squirreltail	5
				Needleandthread	5
				Prairie junegrass	5
				Snowberry	5
				Oregongrape	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
93 Toone	High Mountain Loam (Aspen)	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Quaking aspen	10
				Bluegrass	5
94*:					
Toone	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
Sirref	Mountain Stony Loam	Favorable	1,000	Mountain big sagebrush	15
		Normal	700	Muttongrass	10
		Unfavorable	400	Needleandthread	10
				Blue grama	5
				Brome	5
				Wheatgrass	5
				Prairie junegrass	5
				Serviceberry	5
				Birchleaf mountainmahogany	5
Herm	Mountain Loam (Oak)	Favorable	1,750	Gambel oak	30
		Normal	1,200	Bluegrass	10
		Unfavorable	650	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
95 Trail	Sandy Bottom	Favorable	900	Indian ricegrass	25
		Normal	650	Galleta	15
		Unfavorable	400	Fourwing saltbush	15
				Dropseed	10
				Needleandthread	5
				Globemallow	5
				Mormon tea	5
				Winterfat	5
96 Tukuhnik	Mountain Loam (Ponderosa Pine)	Favorable	1,500	Gambel oak	15
		Normal	1,100	Muttongrass	10
		Unfavorable	700	Elk sedge	10
				Bottlebrush squirreltail	5
				Needleandthread	5
				Prairie junegrass	5
				Snowberry	5
				Oregongrape	5
97*:					
Ustic Torrifluvents	Loamy Bottom	Favorable	2,000	Blue grama	15
		Normal	1,600	Basin big sagebrush	15
		Unfavorable	1,000	Western wheatgrass	10
				Rubber rabbitbrush	10
				Needleandthread	5
				Muttongrass	5
				Bottlebrush squirreltail	5
				Indian ricegrass	5
				Fourwing saltbush	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
97*:					
Ustic Torrifluvents, sodic	Alkali Flat	Favorable	1,000	Black greasewood	30
		Normal	750	Bottlebrush squirreltail	20
		Unfavorable	500	Alkali sacaton	10
				Galleta	5
				Seepweed	5
Typic Ustifluvents	Semiwet Salt Streambank	Favorable	1,800	Alkali sacaton	35
		Normal	1,300	Coyote willow	15
		Unfavorable	900	Inland saltgrass	10
				Indian ricegrass	5
				Fremont cottonwood	5
				Rubber rabbitbrush	5
				Saltcedar	5
98 Ustic Torriorthents	Semidesert Stony Loam (Blackbrush)	Favorable	750	Blackbrush	35
		Normal	500	Galleta	20
		Unfavorable	300	Indian ricegrass	15
				Mormon tea	5
99*:					
Ustic Torriorthents	Talus Slope	Favorable	300	Blackbrush	15
		Normal	225	Shadscale	15
		Unfavorable	100	Salina wildrye	10
				Galleta	10
				Indian ricegrass	5
				Mormon tea	5
Lithic Torriorthents	Desert Shallow Sandy Loam (Blackbrush)	Favorable	350	Blackbrush	55
		Normal	200	Galleta	10
		Unfavorable	100	Indian ricegrass	5
				Shadscale	5
				Mormon tea	5
				Broom snakeweed	5
Rock outcrop.					
100*:					
Ustic Torriorthents	Talus Slope	Favorable	300	Blackbrush	15
		Normal	225	Shadscale	15
		Unfavorable	100	Salina wildrye	10
				Galleta	10
				Indian ricegrass	5
				Mormon tea	5
Ustollic Calciorthids	Semidesert Gravelly Loam (Utah Juniper-Pinyon)	Favorable	800	Fourwing saltbush	15
		Normal	550	Galleta	10
		Unfavorable	400	Mormon tea	10
				Indian ricegrass	5
				Needleandthread	5
				Blue grama	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight (Lb/acre)	Characteristic vegetation	Composition (Pct)
101*:					
Ustic Torriorthents	Talus Slope	Favorable	300	Blackbrush	15
		Normal	225	Shadscale	15
		Unfavorable	100	Salina wildrye	10
				Galleta	10
				Indian ricegrass	5
				Mormon tea	5
Ustollic Haplargids	Upland Stony Loam (Pinyon-Utah Juniper)	Favorable	1,000	Green Mormon tea	10
		Normal	700	Rock goldenrod	10
		Unfavorable	500	Nevada bluegrass	8
				Muttongrass	8
				Blue grama	5
				Prairie junegrass	5
				Pinyon	5
102 Waas	Mountain Loam	Favorable	1,800	Bluegrass	15
		Normal	1,400	Mountain big sagebrush	15
		Unfavorable	1,000	Wheatgrass	10
				Needleandthread	10
				Letterman needlegrass	5
				Brome	5
				Snowberry	5
103 Windwhistle	Upland Loam	Favorable	1,300	Wyoming big sagebrush	20
		Normal	1,000	Indian ricegrass	15
		Unfavorable	800	Needleandthread	15
				Muttongrass	5
				Blue grama	5
				Galleta	5
				Sand dropseed	5
				Bottlebrush squirreltail	5
				Fourwing saltbush	5
				Winterfat	5
104*:					
Windwhistle	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5
Sazi	Semidesert Sandy Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Needleandthread	15
		Unfavorable	300	Sand dropseed	10
				Galleta	10
				Fourwing saltbush	10
				Mormon tea	10
				Winterfat	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1*:					
Arches	Severe: too sandy, depth to rock.	Severe: too sandy, depth to rock.	Severe: too sandy, depth to rock.	Severe: too sandy.	Severe: depth to rock.
Sheppard	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Rock outcrop.					
2*. Badland					
3 Barnum	Severe: flooding.	Moderate: dusty.	Moderate: flooding, dusty.	Severe: erodes easily.	Moderate: flooding.
4 Barnum	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
5 Barnum	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.	Severe: excess sodium.
6 Barx	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
7, 8 Begay	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
9*:					
Begay	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: depth to rock.
10*:					
Begay	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
Rock outcrop.					
Mido	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
11 Bluechief	Slight	Slight	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: depth to rock.
12*:					
Bluechief	Slight	Slight	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: depth to rock.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
12*:					
Hanksville	Severe: excess salt.	Severe: excess salt.	Severe: slope, excess salt.	Severe: erodes easily.	Severe: excess salt.
Leeko	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
13 Bluehon	Moderate: slope, small stones, dusty.	Moderate: slope, small stones, dusty.	Severe: slope, small stones.	Moderate: large stones, dusty.	Severe: large stones.
14*:					
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: depth to rock.
15*:					
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Windwhistle	Moderate: dusty.	Moderate: dusty.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
16*:					
Bookcliff Variant	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.	Moderate: large stones, slope, thin layer.
Beje	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: thin layer.
17 Broad Canyon	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
18 Broad Canyon	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
19 Cahona	Slight	Slight	Moderate: slope.	Slight.	Slight.
20 Cataract	Slight	Slight	Moderate: slope, depth to rock.	Slight.	Moderate: thin layer.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
21*:					
Dranyon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.	Moderate: slope.
Tolman Variant	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: large stones, slope.	Severe: slope, thin layer.
22*:					
Dumps.					
Pits.					
23 Factory	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.	Severe: droughty.
24 Falcon	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: depth to rock.
25 Falcon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
26*:					
Falcon	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: depth to rock.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Rock outcrop.					
27*:					
Falcon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Rock outcrop.					
28 Flygare	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
29 Flygare	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
30 Frolic	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight.	Moderate: flooding.
31 Hughes	Slight	Slight	Severe: slope.	Slight.	Slight.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
32*. Gullied land					
33----------------- Hagerman	Moderate: dusty.	Moderate: dusty.	Moderate: slope, depth to rock, dusty.	Severe: erodes easily.	Moderate: depth to rock.
34----------------- Hangdo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.	Moderate: large stones, slope.
35----------------- Hangdo	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, small stones.	Slight.	Moderate: small stones, large stones.
36----------------- Harpole	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
37----------------- Herm	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.	Moderate: large stones, slope.
38*:					
Herm---------------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.	Moderate: large stones, slope.
Iles---------------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.	Moderate: small stones, large stones, slope.
39*:					
Herm---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tomasaki-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Falcon-------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
40----------------- Hoskinnini	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.	Severe: small stones, thin layer.
41*, 42*:					
Ignacio------------	Slight------------	Slight------------	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: depth to rock.
Leanto-------------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: erodes easily.	Severe: thin layer.
43----------------- Jocity	Slight------------	Slight------------	Moderate: slope.	Severe: erodes easily.	Slight.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
44*:					
Kilfoil Variant	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight.	Moderate: large stones, slope.
Hangdo	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.	Moderate: large stones, slope.
Harpole Variant	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
45, 46 Leighcan	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: droughty, slope.
47*:					
Lithic Torriorthents	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.
Badland.					
Rock outcrop.					
48*:					
Lithic Ustic Torriorthents	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, thin layer.
Badland.					
Rock outcrop.					
49 Meredith	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: large stones, slope.
50, 51 Mido	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Moderate: droughty.
52 Mivida	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Moderate: droughty.
53 Moab	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.	Moderate: small stones, large stones, droughty.
54 Moab	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: small stones, large stones.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
55*:					
Moab	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.	Moderate: small stones, large stones, droughty.
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.	Severe: depth to rock.
56 Moenkopie	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, depth to rock.
57*:					
Moenkopie	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight.	Severe: depth to rock.
Rock outcrop.					
58 Nakai	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
59 Namon	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
60 Namon	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
61 Nepalto	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.	Severe: droughty.
62 Nepalto	Severe: small stones.	Severe: small stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: small stones, large stones, droughty.
63 Newsrock	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Moderate: droughty.
64 Redbank	Severe: flooding.	Slight	Slight	Severe: erodes easily.	Slight.
65 Redbank	Severe: flooding.	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
66 Redbank	Severe: flooding.	Slight	Slight	Severe: erodes easily.	Slight.
67 Redbank	Severe: flooding.	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
68 Redbank	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.	Severe: excess sodium.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
69*:					
Richens	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Herd	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones.
70*:					
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: depth to rock.
Rock outcrop.					
71*:					
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.	Severe: depth to rock.
Rock outcrop.					
72*. Rock outcrop					
73*:					
Rock outcrop.					
Moenkopie	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight.	Severe: depth to rock.
74*:					
Rock outcrop.					
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: depth to rock.
75*:					
Rock outcrop.					
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.	Severe: depth to rock.
76*:					
Rock outcrop.					
Ustic Torripsamments	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, thin layer.
77*. Rubble land					

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
78----------------- Sedillo	Severe: small stones.	Severe: small stones.	Severe: large stones, small stones.	Severe: large stones.	Severe: small stones, large stones.
79*:					
Shalako-----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.	Severe: thin layer.
Anasazi-----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.	Moderate: small stones, slope.
Rock outcrop.					
80----------------- Sheppard	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
81----------------- Sirref	Slight-----------	Slight-----------	Severe: slope.	Slight.	Moderate: large stones, droughty.
82*:					
Sirref------------	Slight-----------	Slight-----------	Severe: slope.	Slight.	Moderate: large stones, droughty.
Toone-------------	Slight-----------	Slight-----------	Severe: slope.	Slight.	Slight.
83----------------- Skylick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
84*. Slickens					
85----------------- Strych	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: small stones, large stones.
86----------------- Strych	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones.
87----------------- Strych	Moderate: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones.
88----------------- Thoroughfare	Severe: flooding.	Slight-----------	Moderate: slope, flooding.	Slight.	Moderate: droughty, flooding.
89----------------- Thoroughfare	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.	Severe: excess sodium.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
90: Tolman Variant	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.	Severe: thin layer.
91: Tomasaki	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.	Moderate: large stones, slope.
92: Tomasaki	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
93: Toone	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.	Moderate: large stones, slope.
94*:					
Toone	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Sirref	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, small stones.	Severe: slope.	Severe: large stones, slope.
Herm	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
95: Trail	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
96: Tukuhnik	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight.	Slight.
97*:					
Ustic Torrifluvents	Severe: flooding.	Slight	Moderate: flooding.	Severe: erodes easily.	Moderate: droughty.
Ustic Torrifluvents, sodic	Severe: flooding.	Slight	Moderate: flooding.	Severe: erodes easily.	Moderate: droughty.
Typic Ustifluvents	Severe: flooding.	Moderate: flooding, excess salt.	Severe: flooding.	Severe: erodes easily.	Severe: flooding.
98: Ustic Torriorthents	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
99*:					
Ustic Torriorthents	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones, slope.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
99*:					
Lithic Torriorthents	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
100*:					
Ustic Torriorthents	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones, slope.
Ustollic Calciorthids	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
101*:					
Ustic Torriorthents	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones, slope.
Ustollic Haplargids	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: large stones, slope.
102 Waas	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
103 Windwhistle	Moderate: dusty.	Moderate: dusty.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
104*:					
Windwhistle	Moderate: dusty.	Moderate: dusty.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
Sazi	Slight	Slight	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: depth to rock.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1*:											
Arches	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Sheppard	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Rock outcrop.											
2*. Badland											
3, 4 Barnum	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Fair	Very poor.	Fair.
5 Barnum	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
6 Barx	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
7, 8 Begay	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
9*:											
Begay	Very poor.	Poor	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rizno	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
10*:											
Begay	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Rock outcrop.											
Mido	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
11 Bluechief	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
12*:											
Bluechief	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Hanksville	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Leeko	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
13 Bluehon	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
14*:											
Bond	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	---	---	---	---	---
Rizno	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
15*:											
Bond	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	---	---	---	---	---
Windwhistle	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Poor	Very poor.	Fair.
16*:											
Bookcliff Variant	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Beje	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
17 Broad Canyon	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
18 Broad Canyon	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
19 Cahona	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
20 Cataract	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
21*:											
Dranyon	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Tolman Variant	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
22*:											
Dumps.											
Pits.											
23 Factory	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
24, 25 Falcon	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
26*, 27*:											
Falcon	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Bond	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
28, 29-----Flygare	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
30-----Frolic	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
31-----Fughes	Fair	Fair	Good	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
32*. Gullied land											
33-----Hagerman	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Fair	Very poor.	Fair.
34-----Hangdo	Fair	Fair	Good	Fair	Fair	Poor	Very Poor.	Good	Good	Poor	Fair.
35-----Hangdo	Poor	Poor	Good	Fair	Fair	Poor	Very poor.	Fair	Good	Poor	Fair.
36-----Harpole	Very poor.	Very poor.	Fair	Poor	Fair	---	Very poor.	Poor	Fair	Very poor.	Fair.
37-----Herm	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
38*: Herm-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Iles-----	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
39*: Herm-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Tomasaki-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Falcon-----	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
40-----Hoskinnini	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
41*, 42*: Ignacio-----	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
Leanto-----	Very poor.	Very poor.	Poor	Poor	Fair	Poor	Very poor.	Poor	Poor	Very poor.	Fair.
43-----Jocity	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
44*: Kilfoil Variant---	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
44*:											
Hangdo	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Good	Good	Poor	Fair.
Harpole Variant	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
45, 46 Leighcan	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
47*:											
Lithic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Badland.											
Rock outcrop.											
48*:											
Lithic Ustic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Badland.											
Rock outcrop.											
49 Meredith	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
50 Mido	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
51 Mido	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
52 Mivida	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Poor.
53, 54 Moab	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
55*:											
Moab	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rizno	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
56 Moenkopie	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
57*:											
Moenkopie	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.											

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
58----------------- Nakai	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
59, 60------------- Namon	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
61, 62------------- Nepalto	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
63----------------- Newsrock	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
64, 65, 66, 67----- Redbank	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Fair	Very poor.	Fair.
68----------------- Redbank	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
69*:											
Richens-----------	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.	Good.
Herd--------------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
70*, 71*:											
Rizno-------------	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.											
72*. Rock outcrop											
73*: Rock outcrop.											
Moenkopie---------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
74*, 75*: Rock outcrop.											
Rizno-------------	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
76*: Rock outcrop.											
Ustic Torripsamments---	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
77*. Rubble land											
78----------------- Sedillo	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
79*:											
Shalako	Very poor.	Very poor.	Poor	Very poor.	Fair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair.
Anasazi	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.											
80 Sheppard	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
81 Sirref	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Good.
82*:											
Sirref	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Good.
Toone	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
83 Skylick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
84*. Slickens											
85, 86, 87 Strych	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
88 Thoroughfare	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
89 Thoroughfare	Very poor.	Very poor.	Fair	Poor	Fair	Poor	Very poor.	Poor	Fair	Very poor.	Fair.
90 Tolman Variant	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
91, 92 Tomasaki	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
93 Toone	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
94*:											
Toone	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Sirref	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Herm	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
95 Trail	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
96: Tukuhnik	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
97*:											
Ustic Torrifluvents	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
Ustic Torrifluvents, sodic	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
Typic Torriorthents	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
98: Ustic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
99*:											
Ustic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Lithic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rock outcrop.											
100*:											
Ustic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Ustollic Calciorthids	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
101*:											
Ustic Torriorthents	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Ustollic Haplargids	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
102: Waas	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Poor	Fair.
103: Windwhistle	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Poor	Very poor.	Fair.
104*: Windwhistle	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
104*:											
Sazi--------------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1*:						
Arches	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
Sheppard	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Rock outcrop.						
2*. Badland						
3 Barnum	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
4 Barnum	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
5 Barnum	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: excess sodium.
6 Barx	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
7, 8 Begay	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
9*:						
Begay	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
10*:						
Begay	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Rock outcrop.						
Mido	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11 Bluechief	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: thin layer.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
12*:						
Bluechief	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: thin layer.
Hanksville	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: excess salt.
Leeko	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
13 Bluehon	Moderate: cemented pan, large stones, slope.	Moderate: slope, large stones.	Moderate: cemented pan, slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: large stones.
14*:						
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
15*:						
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Windwhistle	Severe: cutbanks cave.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
16*:						
Bookcliff Variant	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: large stones, slope, thin layer.
Beje	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
17 Broad Canyon	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
18 Broad Canyon	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
19 Cahona	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
20 Cataract	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: thin layer.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
21*:						
Dranyon	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: slope.
Tolman Variant	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, thin layer.
22*:						
Dumps.						
Pits.						
23 Factory	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: slope, cemented pan.	Moderate: cemented pan, frost action.	Severe: droughty.
24 Falcon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
25 Falcon	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
26*:						
Falcon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rock outcrop.						
27*:						
Falcon	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rock outcrop.						
28, 29 Flygare	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
30 Frolic	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
31 Fughes	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
32*. Gullied land						
33---------------- Hagerman	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Moderate: depth to rock, frost action, shrink-swell.	Moderate: thin layer.
34---------------- Hangdo	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: large stones, slope.
35---------------- Hangdo	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: small stones, large stones.
36---------------- Harpole	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
37---------------- Herm	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: large stones, slope.
38*:						
Herm--------------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: large stones, slope.
Iles--------------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, large stones, slope.
39*:						
Herm--------------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Tomasaki----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Falcon------------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
40---------------- Hoskinnini	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
41*, 42*:						
Ignacio-----------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: thin layer.
Leanto------------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
43 Jocity	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
44*:						
Kilfoil Variant	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: large stones, slope.
Hangdo	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: large stones, slope.
Harpole Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
45, 46 Leighcan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
47*:						
Lithic Torriorthents	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Badland.						
Rock outcrop.						
48*:						
Lithic Ustic Torriorthents	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Badland.						
Rock outcrop.						
49 Meredith	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
50, 51 Mido	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
52 Mivida	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
53 Moab	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: frost action, large stones.	Moderate: small stones, large stones, droughty.
54 Moab	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
55*:						
Moab	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: frost action, large stones.	Moderate: small stones, large stones, droughty.
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
56 Moenkopie	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, thin layer.
57*:						
Moenkopie	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rock outcrop.						
58 Nakai	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
59, 60 Namon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
61 Nepalto	Severe: cutbanks cave, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: droughty.
62 Nepalto	Severe: cutbanks cave, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: small stones, large stones, droughty.
63 Newsrock	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
64, 65, 66, 67 Redbank	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
68 Redbank	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: excess sodium.
69*:						
Richens	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Severe: shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Herd	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action, shrink-swell.	Severe: large stones.
70*, 71*:						
Rizno	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
70*, 71*: Rock outcrop.						
72*. Rock outcrop						
73*: Rock outcrop.						
Moenkopie--------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
74*, 75*: Rock outcrop.						
Rizno------------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
76*: Rock outcrop.						
Ustic Torripsamments--	Severe: depth to rock, cutbanks cave.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: droughty, slope, thin layer.
77*. Rubble land						
78---------------- Sedillo	Severe: cutbanks cave, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: small stones, large stones.
79*: Shalako----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
Anasazi----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: small stones, slope.
Rock outcrop.						
80---------------- Sheppard	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
81---------------- Sirref	Moderate: too clayey, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope, large stones.	Moderate: frost action, shrink-swell.	Moderate: large stones, droughty.
82*: Sirref----------	Moderate: too clayey, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope, large stones.	Moderate: frost action, shrink-swell.	Moderate: large stones, droughty.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
82*:						
Toone	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
83 Skylick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
84*. Slickens						
85, 86 Strych	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones.
87 Strych	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: large stones.
88 Thoroughfare	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
89 Thoroughfare	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: excess sodium.
90 Tolman Variant	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: thin layer.
91 Tomasaki	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
92 Tomasaki	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
93 Toone	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
94*:						
Toone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sirref	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Herm	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
95 Trail	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
96----------------- Tukuhnik	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
97*:						
Ustic Torrifluvents---	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty.
Ustic Torrifluvents, sodic----------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty.
Typic Ustifluvents----	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
98----------------- Ustic Torriorthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
99*:						
Ustic Torriorthents---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Lithic Torriorthents---	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
100*:						
Ustic Torriorthents---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Ustollic Calciorthids----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
101*:						
Ustic Torriorthents---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Ustollic Haplargids------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
102---------------- Waas	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: frost action.	Slight.
103---------------- Windwhistle	Severe: cutbanks cave.	Slight---------	Moderate: depth to rock.	Slight---------	Moderate: frost action.	Moderate: thin layer.
104*:						
Windwhistle------	Severe: cutbanks cave.	Slight---------	Moderate: depth to rock.	Slight---------	Moderate: frost action.	Moderate: thin layer.
Sazi--------------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Arches	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, too sandy.	Severe: depth to rock.	Poor: area reclaim, too sandy.
Sheppard	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
Rock outcrop.					
2*. Badland					
3 Barnum	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy.
4 Barnum	Severe: percs slowly.	Moderate: slope.	Moderate: too sandy.	Slight	Fair: too sandy.
5 Barnum	Severe: flooding, percs slowly.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Fair: thin layer.
6 Barx	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
7, 8 Begay	Slight	Severe: seepage.	Slight	Slight	Good.
9*:					
Begay	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Rizno	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
10*:					
Begay	Slight	Severe: seepage.	Slight	Slight	Good.
Rock outcrop.					
Mido	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: seepage, too sandy, slope.
11 Bluechief	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
12*:					
Bluechief	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Hanksville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, excess salt.	Severe: depth to rock.	Poor: area reclaim.
Leeko	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Good.
13 Bluehon	Severe: cemented pan, poor filter.	Severe: seepage, cemented pan, slope.	Severe: large stones.	Severe: cemented pan.	Poor: area reclaim, small stones.
14*:					
Bond	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rizno	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
15*:					
Bond	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Windwhistle	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
16*:					
Bookcliff Variant	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Beje	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
17 Broad Canyon	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
18 Broad Canyon	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
19 Cahona	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
20 Cataract	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21*:					
Dranyon	Severe: percs slowly.	Severe: seepage, slope.	Severe: depth to rock.	Severe: seepage.	Poor: large stones.
Tolman Variant	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
22*:					
Dumps.					
Pits.					
23 Factory	Severe: cemented pan.	Severe: seepage, cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Poor: area reclaim, small stones.
24 Falcon	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
25 Falcon	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
26*:					
Falcon	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Bond	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
27*:					
Falcon	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Bond	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
28, 29 Flygare	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
30 Frolic	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
31 Fughes	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
32*. Gullied land					
33 Hagerman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
34, 35 Hangdo	Severe: percs slowly.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Fair: small stones, slope.
36 Harpole	Severe: percs slowly, poor filter, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
37 Herm	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
38*: Herm	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Iles	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
39*: Herm	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
Tomasaki	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
Falcon	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
40 Hoskinnini	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, large stones.
41*, 42*: Ignacio	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Leanto	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
43 Jocity	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
44*: Kilfoil Variant	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
44*:					
Hangdo	Severe: percs slowly.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Fair: small stones, slope.
Harpole Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
45, 46 Leighcan	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
47*:					
Lithic Torriorthents	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Badland.					
47*:					
Rock outcrop.					
48*:					
Lithic Ustic Torriorthents	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Badland.					
Rock outcrop.					
49 Meredith	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
50, 51 Mido	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy.
52 Mivida	Moderate: depth to rock.	Severe: seepage.	Severe: depth to rock.	Moderate: depth to rock.	Fair: area reclaim, thin layer.
53 Moab	Moderate: large stones.	Severe: seepage.	Moderate: large stones.	Slight	Poor: small stones.
54 Moab	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
55*:					
Moab	Moderate: large stones.	Severe: seepage.	Moderate: large stones.	Slight	Poor: small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
55*:					
Rizno	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
56 Moenkopie	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
57*:					
Moenkopie	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
58 Nakai	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
59, 60 Namon	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
61, 62 Nepalto	Severe: poor filter, large stones.	Severe: seepage, large stones.	Severe: too sandy, large stones.	Slight	Poor: seepage, too sandy, small stones.
63 Newsrock	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
64, 65, 66, 67 Redbank	Moderate: flooding.	Severe: seepage, flooding.	Moderate: flooding.	Moderate: flooding.	Good.
68 Redbank	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy.
69*:					
Richens	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, small stones.
Herd	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
70*, 71*:					
Rizno	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Rock outcrop.					
72* Rock outcrop					

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73*:					
Rock outcrop.					
Moenkopie	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
74*, 75*:					
Rock outcrop.					
Rizno	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
76*:					
Rock outcrop.					
Ustic Torripsamments	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, too sandy.	Severe: depth to rock, seepage.	Poor: area reclaim, too sandy.
77*. Rubble land					
78 Sedillo	Severe: large stones.	Severe: seepage, large stones.	Severe: large stones.	Slight	Poor: large stones.
79*:					
Shalako	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Anasazi	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
80 Sheppard	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
81 Sirref	Severe: percs slowly.	Moderate: seepage, slope, large stones.	Severe: too clayey, large stones.	Slight	Poor: too clayey, small stones.
82*:					
Sirref	Severe: percs slowly.	Moderate: seepage, slope, large stones.	Severe: too clayey, large stones.	Slight	Poor: too clayey, small stones.
Toone	Severe: percs slowly.	Severe: seepage, slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
83------------------ Skylick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
84*. Slickens					
85, 86-------------- Strych	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
87------------------ Strych	Moderate: slope, large stones.	Severe: seepage, slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: large stones.
88------------------ Thoroughfare	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy, small stones.
89------------------ Thoroughfare	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: too sandy.
90------------------ Tolman Variant	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, small stones.
91------------------ Tomasaki	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
92------------------ Tomasaki	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
93------------------ Toone	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, small stones.
94*:					
Toone--------------	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, small stones, slope.
Sirref-------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, large stones.	Severe: slope.	Poor: too clayey, small stones, slope.
Herm---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
95------------------ Trail	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight-----------	Poor: too sandy.
96------------------ Tukuhnik	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: thin layer.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
97*:					
Ustic Torrifluvents	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, excess salt.	Severe: flooding, seepage.	Poor: excess salt.
Ustic Torrifluvents, sodic------------	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, excess salt.	Severe: flooding, seepage.	Poor: excess salt.
Typic Ustifluvents-	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: too sandy, small stones, excess salt.
98------------------ Ustic Torriorthents	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
99*:					
Ustic Torriorthents	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Lithic Torriorthents-----	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
100*:					
Ustic Torriorthents	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Ustollic Calciorthids------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
101*:					
Ustic Torriorthents	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Ustollic Haplargids	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
102----------------- Waas	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
103----------------- Windwhistle	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
104*:					
Windwhistle--------	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Sazi---------------	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*:				
Arches	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too sandy.
Sheppard	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Rock outcrop.				
2*. Badland				
3, 4 Barnum	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
5 Barnum	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
6 Barx	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
7, 8 Begay	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
9*:				
Begay	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, slope.
Rizno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
10*:				
Begay	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Rock outcrop.				
Mido	Fair: slope.	Probable	Improbable: too sandy.	Poor: thin layer, slope.
11 Bluechief	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
12*:				
Bluechief	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
12*:				
Hanksville	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
Leeko	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
13 Bluehon	Fair: thin layer, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
14*:				
Bond	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Rizno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
15*:				
Bond	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Windwhistle	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
16*:				
Bookcliff Variant	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Beje	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
17 Broad Canyon	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
18 Broad Canyon	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
19 Cahona	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
20 Cataract	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too sandy, small stones.
21*:				
Dranyon	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
21*:				
Tolman Variant	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
22*:				
Dumps.				
Pits.				
23 Factory	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
24 Falcon	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
25 Falcon	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
26*:				
Falcon	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Bond	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Rock outcrop.				
27*:				
Falcon	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Bond	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Rock outcrop.				
28 Flygare	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
29 Flygare	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
30 Frolic	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
31 Fughes	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
32*. Gullied land				
33 Hagerman	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
34, 35 Hangdo	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
36 Harpole	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
37 Herm	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
38*:				
Herm	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Iles	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
39*:				
Herm	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Tomasaki	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Falcon	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
40 Hoskinnini	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones.
41*, 42*:				
Ignacio	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
Leanto	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
43 Jocity	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
44*:				
Kilfoil Variant	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Hangdo	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Harpole Variant	Fair: slope, shrink-swell.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
45, 46 Leighcan	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
47*:				
Lithic Torriorthents	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Badland.				
Rock outcrop.				
48*:				
Lithic Ustic Torriorthents	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Badland.				
Rock outcrop.				
49 Meredith	Poor: large stones, slope.	Improbable: small stones, large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
50, 51 Mido	Good	Probable	Improbable: too sandy.	Poor: thin layer.
52 Mivida	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Good.
53 Moab	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
54 Moab	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
55*:				
Moab	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Rizno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
56 Moenkopie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
57*:				
Moenkopie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Rock outcrop.				
58 Nakai	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
59 Namon	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
60 Namon	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
61, 62 Nepalto	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: small stones, area reclaim.
63 Newsrock	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
64, 65, 66, 67 Redbank	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
68 Redbank	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
69*:				
Richens	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Herd	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
70*, 71*:				
Rizno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
72*. Rock outcrop				
73*: Rock outcrop.				
Moenkopie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
74*, 75*: Rock outcrop.				
Rizno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
76*: Rock outcrop.				
Ustic Torripsamments	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
77*. Rubble land				
78 Sedillo	Poor: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
79*: Shalako	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Anasazi	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Rock outcrop.				
80 Sheppard	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
81 Sirref	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
82*: Sirref	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Toone	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
83 Skylick	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
84*. Slickens				

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
85: Strych	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
86: Strych	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
87: Strych	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
88: Thoroughfare	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
89: Thoroughfare	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, excess sodium.
90: Tolman Variant	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
91: Tomasaki	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
92: Tomasaki	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
93: Toone	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
94*:				
Toone	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Sirref	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Herm	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
95: Trail	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
96: Tukuhnik	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
97*:				
Ustic Torrifluvents	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ustic Torrifluvents, sodic	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Typic Ustifluvents	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
98 Ustic Torriorthents	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
99*:				
Ustic Torriorthents	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Lithic Torriorthents	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
100*:				
Ustic Torriorthents	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Ustollic Calciorthids	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
101*:				
Ustic Torriorthents	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Ustollic Haplargids	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
102 Waas	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
103 Windwhistle	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
104*:				
Windwhistle----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
Sazi-----------------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*:						
Arches	Severe: depth to rock.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Depth to rock, erodes easily, too sandy.	Erodes easily, droughty, depth to rock.
Sheppard	Severe: seepage.	Slight	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Rock outcrop.						
2*. Badland						
3 Barnum	Slight	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
4 Barnum	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
5 Barnum	Moderate: seepage.	Severe: excess sodium.	Deep to water	Percs slowly, erodes easily, flooding.	Erodes easily	Excess sodium, erodes easily, percs slowly.
6 Barx	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, slope, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
7, 8 Begay	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
9*:						
Begay	Severe: seepage, slope.	Severe: piping.	Deep to water	Fast intake, soil blowing, slope.	Slope, erodes easily, soil blowing.	Slope, erodes easily.
Rizno	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
10*:						
Begay	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily.
Rock outcrop.						
Mido	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
11 Bluechief	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
12*:						
Bluechief	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.
Hanksville	Severe: slope.	Severe: excess salt.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, excess salt, erodes easily.
Leeko	Moderate: seepage.	Severe: piping.	Deep to water	Fast intake, soil blowing, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
13 Bluehon	Severe: seepage, slope.	Severe: large stones.	Deep to water	Large stones, droughty, cemented pan.	Slope, large stones, cemented pan.	Large stones, slope, droughty.
14*:						
Bond	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rizno	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
15*:						
Bond	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Windwhistle	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
16*:						
Bookcliff Variant	Severe: slope.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Beje	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
17 Broad Canyon	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
18 Broad Canyon	Severe: seepage, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
19 Cahona	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Soil blowing, rooting depth, slope.	Erodes easily, soil blowing.	Erodes easily, rooting depth.
20 Cataract	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Fast intake, soil blowing, depth to rock.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
21*:						
Dranyon	Severe: slope.	Moderate: thin layer, piping, large stones.	Deep to water	Soil blowing, slope.	Slope, large stones, soil blowing.	Large stones, slope.
Tolman Variant	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
22*:						
Dumps.						
Pits.						
23 Factory	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, cemented pan, slope.	Cemented pan	Droughty, cemented pan.
24 Falcon	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
25 Falcon	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
26*:						
Falcon	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Bond	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
27*:						
Falcon	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Bond	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
28, 29 Flygare	Severe: slope.	Severe: piping.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
30 Frolic	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, flooding.	Erodes easily	Erodes easily.
31 Fughes	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
32*. Gullied land						
33---------------- Hagerman	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.
34, 35------------ Hangdo	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
36---------------- Harpole	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
37---------------- Herm	Severe: slope.	Slight---------	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
38*:						
Herm-------------	Severe: slope.	Slight---------	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Iles-------------	Severe: slope.	Slight---------	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
39*:						
Herm-------------	Severe: slope.	Slight---------	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Tomasaki---------	Severe: slope.	Slight---------	Deep to water	Percs slowly, slope.	Slope, large stones, percs slowly.	Slope, percs slowly.
Falcon-----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
40---------------- Hoskinnini	Severe: depth to rock.	Severe: thin layer.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock, erodes easily.	Large stones, erodes easily, droughty.
41*, 42*:						
Ignacio----------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.
Leanto-----------	Severe: depth to rock.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, erodes easily, soil blowing.	Erodes easily, depth to rock.
43---------------- Jocity	Severe: seepage.	Moderate: piping.	Deep to water	Favorable------	Erodes easily	Erodes easily.
44*:						
Kilfoil Variant--	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Slope.
Hangdo-----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
44*: Harpole Variant--	Severe: slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
45, 46------------ Leighcan	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
47*: Lithic Torriorthents---	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Badland.						
Rock outcrop.						
48*: Lithic Ustic Torriorthents---	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Droughty, depth to rock.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Badland.						
Rock outcrop.						
49---------------- Meredith	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
50, 51------------ Mido	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Erodes easily, too sandy.	Erodes easily, droughty.
52---------------- Mivida	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing, slope.	Erodes easily, soil blowing.	Erodes easily, droughty.
53---------------- Moab	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Large stones---	Large stones, droughty.
54---------------- Moab	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
55*: Moab-------------	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Large stones---	Large stones, droughty.
Rizno------------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
56---------------- Moenkopie	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
57*: Moenkopie	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock
Rock outcrop.						
58 Nakai	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Erodes easily, soil blowing.	Erodes easily, droughty.
59, 60 Namon	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
61, 62 Nepalto	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Large stones, too sandy.	Large stones, droughty.
63 Newsrock	Severe: seepage.	Severe: piping.	Deep to water	Droughty, fast intake, soil blowing.	Erodes easily, soil blowing.	Erodes easily, droughty.
64 Redbank	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
65 Redbank	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
66 Redbank	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
67 Redbank	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
68 Redbank	Severe: seepage.	Severe: seepage, piping, excess sodium.	Deep to water	Droughty, soil blowing, erodes easily.	Erodes easily, soil blowing.	Excess sodium, erodes easily, droughty.
69*: Richens	Severe: slope.	Slight	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Herd	Severe: slope.	Moderate: hard to pack, large stones.	Deep to water	Percs slowly, slope.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
70*: Rizno	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
71*:						
Rizno	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
Rock outcrop.						
72*. Rock outcrop						
73*: Rock outcrop.						
Moenkopie	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
74*: Rock outcrop.						
Rizno	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, soil blowing, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
75*: Rock outcrop.						
Rizno	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
76*: Rock outcrop.						
Ustic Torripsamments	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
77*. Rubble land						
78 Sedillo	Severe: seepage.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Large stones	Large stones, droughty.
79*:						
Shalako	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Anasazi	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
80 Sheppard	Severe: seepage.	Slight	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
81 Sirref	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Large stones, droughty, percs slowly.	Large stones, percs slowly.	Large stones, droughty.
82*:						
Sirref	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Large stones, droughty, percs slowly.	Large stones, percs slowly.	Large stones, droughty.
Toone	Severe: seepage.	Slight	Deep to water	Percs slowly, slope.	Large stones, percs slowly.	Percs slowly.
83 Skylick	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope, large stones.	Slope.
84*. Slickens						
85, 86 Strych	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.	Slope, large stones, too sandy.	Large stones, slope, droughty.
87 Strych	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
88 Thoroughfare	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing, slope.	Too sandy, soil blowing.	Droughty.
89 Thoroughfare	Severe: seepage.	Severe: piping, excess sodium.	Deep to water	Droughty	Erodes easily, too sandy.	Excess sodium, erodes easily, droughty.
90 Tolman Variant	Severe: depth to rock.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty.
91, 92 Tomasaki	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, large stones, percs slowly.	Slope, percs slowly.
93 Toone	Severe: slope.	Moderate: large stones.	Deep to water	Percs slowly, slope.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
94*:						
Toone	Severe: seepage, slope.	Slight	Deep to water	Percs slowly, slope.	Slope, large stones, percs slowly.	Slope, percs slowly.
Sirref	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, percs slowly.	Large stones, slope, droughty.
Herm	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
95 Trail	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy	Droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
96 Tukuhnik	Moderate: depth to rock, slope.	Moderate: thin layer.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
97*:						
Ustic Torrifluvents	Severe: seepage.	Severe: piping, excess salt.	Deep to water	Droughty, fast intake, soil blowing.	Erodes easily, soil blowing.	Erodes easily, droughty.
Ustic Torrifluvents, sodic	Severe: seepage.	Severe: piping, excess salt.	Deep to water	Droughty, fast intake, soil blowing.	Erodes easily, soil blowing.	Erodes easily, droughty.
Typic Ustifluvents	Severe: seepage.	Severe: seepage, excess salt.	Deep to water	Droughty, erodes easily, flooding.	Erodes easily, too sandy.	Excess salt, erodes easily, droughty.
98 Ustic Torriorthents	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
99*:						
Ustic Torriorthents	Severe: slope.	Severe: large stones.	Deep to water	Large stones, fast intake, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Lithic Torriorthents	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, soil blowing.	Slope, depth to rock, soil blowing.	Slope, droughty, depth to rock.
Rock outcrop.						
100*:						
Ustic Torriorthents	Severe: slope.	Severe: large stones.	Deep to water	Large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Ustollic Calciorthids	Severe: slope.	Moderate: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
101*:						
Ustic Torriorthents	Severe: slope.	Severe: large stones.	Deep to water	Large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Ustollic Haplargids	Severe: slope.	Severe: piping.	Deep to water	Large stones, percs slowly, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
102---------------- Waas	Moderate: slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.	Erodes easily, soil blowing.	Erodes easily.
103---------------- Windwhistle	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
104*:						
Windwhistle-------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Sazi--------------	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Arches----------	0-4	Fine sand--------	SM	A-2	0	100	100	70-85	20-30	---	NP
	4-19	Fine sand--------	SM	A-2	0	100	100	75-85	20-35	---	NP
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sheppard--------	0-3	Fine sand--------	SM	A-2	0	100	100	65-80	10-20	---	NP
	3-60	Loamy fine sand, fine sand, loamy sand.	SM	A-2	0	100	90-100	70-80	15-25	---	NP
Rock outcrop.											
2*. Badland											
3, 4------------- Barnum	0-3	Loam-------------	CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-10
	3-60	Stratified loamy fine sand to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	70-100	50-70	20-35	5-15
5---------------- Barnum	0-3	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-15
	3-43	Silty clay loam, sandy clay loam.	CL	A-6	0	100	100	80-95	60-90	30-40	10-15
	43-62	Fine sand, loamy fine sand.	SM	A-2	0	100	100	70-85	25-35	---	NP
6---------------- Barx	0-2		SM, SM-SC	A-4	0	100	100	70-95	40-65	20-30	NP-10
	2-18	Fine sandy loam	CL-ML	A-4	0	100	100	85-95	60-70	20-30	5-10
	18-29	Sandy clay loam	CL	A-6	0	100	100	90-100	50-70	25-40	10-20
	29-60	Sandy loam-------	SM, SM-SC	A-4	0	100	100	70-85	40-50	20-25	NP-5
7---------------- Begay	0-3	Fine sandy loam	SM	A-4	0	100	100	70-85	40-50	20-25	NP-5
	3-42	Very fine sandy loam, fine sandy loam, sandy loam.	ML, CL-ML	A-4	0	100	100	80-95	50-65	20-30	NP-10
	42-60	Very fine sandy loam, loamy fine sand, fine sandy loam.	ML, SM	A-4, A-2	0	100	100	75-95	30-60	---	NP
8---------------- Begay	0-3	Fine sandy loam	SM	A-4	0	100	100	70-85	40-50	20-25	NP-5
	3-32	Very fine sandy loam, fine sandy loam, sandy loam.	ML, CL-ML	A-4	0	100	100	80-95	50-65	20-30	NP-10
	32-60	Very fine sandy loam, loamy fine sand, fine sandy loam.	ML, SM	A-4, A-2	0	100	100	75-95	30-60	---	NP
9*:											
Begay-----------	0-4	Loamy fine sand	SM	A-2, A-4	0	100	100	75-90	30-50	---	NP
	4-60	Very fine sandy loam, fine sandy loam, sandy loam.	ML, CL-ML	A-4	0	100	100	80-95	50-65	20-30	NP-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
9*:											
Rizno	0-2	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	80-100	75-100	55-85	35-55	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10*:											
Begay	0-3	Fine sandy loam	SM	A-4	0	100	100	70-85	40-50	20-25	NP-5
	3-32	Very fine sandy loam, fine sandy loam, sandy loam.	ML, CL-ML	A-4	0	100	100	80-95	50-65	20-30	NP-10
	32-60	Very fine sandy loam, loamy fine sand, fine sandy loam.	ML, SM	A-4, A-2	0	100	100	75-95	30-60	---	NP
Rock outcrop.											
Mido	0-27	Loamy fine sand	SM	A-2, A-4	0	100	100	75-95	30-50	---	NP
	27-60	Loamy fine sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	100	70-95	5-35	---	NP
11 Bluechief	0-3	Fine sandy loam	SM	A-4	0	100	100	65-80	35-50	20-25	NP-5
	3-25	Fine sandy loam, loam.	SM-SC, SM, CL-ML, ML	A-4	0	100	100	70-85	40-55	20-30	NP-10
	25-38	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0-5	90-100	85-100	75-85	45-55	20-30	NP-10
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
12*:											
Bluechief	0-3	Fine sandy loam	SM	A-4	0	100	100	65-80	35-50	20-25	NP-5
	3-25	Fine sandy loam, loam.	SM-SC, SM, CL-ML, ML	A-4	0	100	100	70-85	40-55	20-30	NP-10
	25-38	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0-5	90-100	85-100	75-85	45-55	20-30	NP-10
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hanksville	0-2	Clay loam	CL	A-6, A-7	0	100	100	90-100	70-80	35-45	15-25
	2-37	Clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	80-95	35-45	15-25
	37	Weathered bedrock	---	---	---	---	---	---	---	---	---
Leeko	0-2	Loamy fine sand	SM	A-2, A-4	0	100	100	95-100	30-45	15-20	NP-5
	2-14	Loam	CL	A-6	0	100	100	95-100	65-80	25-35	10-15
	14-51	Sandy clay loam, sandy loam.	SM-SC, CL-ML	A-4	0	100	100	70-95	45-60	25-30	5-10
	51-60	Loamy sand	SM	A-2	0	100	100	65-80	20-35	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
13---------------- Bluehon	0-5	Stony loam--------	SM-SC	A-2, A-4	15-35	70-80	60-75	35-60	20-50	20-25	5-10
	5-15	Cobbly sandy clay loam, very cobbly sandy clay loam, very gravelly sandy clay loam.	GC, SC, SM-SC, GM-GC	A-2, A-6, A-4	15-35	40-80	35-75	25-60	15-40	25-35	5-15
	15-33	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	GM-GC	A-2	15-40	40-60	35-55	25-50	10-35	25-30	5-10
	33	Indurated---------	---	---	---	---	---	---	---	---	---
14*: Bond------------	0-2	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-85	40-55	15-25	NP-10
	2-6	Very fine sandy loam.	CL-ML	A-4	0	100	95-100	90-100	50-60	20-25	5-10
	6-19	Loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-10	90-100	85-95	75-90	60-80	25-35	5-15
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rizno-----------	0-2	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	80-100	75-100	55-85	35-55	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15*: Bond------------	0-5	Loam-------------	SM-SC, CL-ML	A-4	0	95-100	90-100	70-85	40-55	20-25	5-10
	5-13	Loam, silty clay loam.	CL	A-6	0-10	90-100	85-95	75-90	60-80	25-35	10-15
	13	Unweathered bedrock.	---	---	---	---	---5	---	---	---	---
Windwhistle-----	0-2	Very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	90-100	45-60	15-25	NP-10
	2-25	Very fine sandy loam, fine sandy loam.	SM-SC, CL-ML	A-4	0	100	100	85-100	40-60	20-30	5-10
	25-38	Fine sandy loam, loamy fine sand.	SM, SM-SC	A-2, A-4	0	100	100	90-100	30-50	15-25	NP-10
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
16*: Bookcliff Variant--------	0-4	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0-10	95-100	90-100	65-85	35-55	15-25	NP-10
	4-10	Loam-------------	CL-ML	A-4	0-10	95-100	90-100	75-95	55-75	20-30	5-10
	10-27	Sandy clay loam, clay loam.	SC, CL	A-6	0-10	90-100	85-95	70-95	40-75	30-40	10-15
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
16*:											
Beje	0-7	Loam	CL-ML	A-4	0-10	90-100	85-100	75-95	55-75	20-35	5-10
	7-19	Clay loam, loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-95	50-80	25-35	5-15
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
17 Broad Canyon	0-11	Very cobbly loam	SM-SC, GM-GC	A-4	25-35	65-75	60-70	50-60	35-45	25-30	5-10
	11-30	Very cobbly sandy loam.	SM-SC, GM-GC	A-2	35-50	60-70	55-65	30-40	15-25	20-30	5-10
	30-60	Extremely cobbly loamy sand.	GP-GM, GM-GC, GM	A-1	60-70	40-55	35-50	25-30	10-15	15-25	NP-5
18 Broad Canyon	0-15	Very stony loam	SM-SC, GM-GC	A-4	40-50	70-80	65-75	50-65	35-45	20-25	5-10
	15-32	Very cobbly loam	SM-SC, GM-GC	A-4	40-50	70-80	65-75	50-65	35-45	20-30	5-10
	32-60	Extremely cobbly loam.	GM-GC	A-2	60-70	50-60	45-55	35-45	25-35	20-30	5-10
19 Cahona	0-2	Fine sandy loam	SM	A-4	0	100	100	95-100	40-50	15-25	NP-5
	2-20	Sandy clay loam, silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	80-95	30-40	10-20
	20-60	Very fine sandy loam, loam, fine sandy loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	50-95	20-35	5-15
20 Cataract	0-2	Loamy fine sand	SM	A-2, A-4	0	95-100	90-100	60-80	30-50	---	NP
	2-9	Fine sandy loam, clay loam, sandy clay loam.	SM-SC, CL-ML, SC CL	A-4, A-6	0	95-100	90-100	75-90	40-70	20-35	5-15
	9-33	Fine sandy loam, loam.	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	75-90	35-65	20-30	NP-10
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
21*:											
Dranyon	0-13	Sandy loam	SM-SC, CL-ML	A-4	0-5	95-100	90-100	65-85	40-75	20-30	5-10
	13-19	Loam, gravelly sandy loam.	CL-ML	A-4	0-15	90-100	75-95	65-80	55-70	25-30	5-10
	19-38	Cobbly sandy clay loam, cobbly clay loam, stony sandy clay loam.	SC, CL	A-6	25-35	75-85	70-80	55-65	35-60	30-40	10-15
	38-52	Very cobbly clay loam.	GC	A-2	40-50	50-60	40-50	30-40	25-35	35-45	10-20
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tolman Variant	0-3	Cobbly loam	SM-SC	A-4	15-30	75-90	65-85	60-70	40-50	20-30	5-10
	3-8	Extremely cobbly loam.	GM-GC, GC	A-2	60-70	30-50	25-45	20-40	15-30	25-35	5-15
	8-17	Very cobbly sandy clay loam, very gravelly clay loam.	GM-GC, SM-SC, SC GC	A-2, A-4, A-6	30-60	45-75	35-70	30-65	15-50	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22*: Dumps.											
Pits.											
23--------------- Factory	0-2	Gravelly fine sandy loam.	SM, GM	A-2, A-4	0	60-90	55-75	40-60	25-40	20-25	NP-5
	2-18	Gravelly fine sandy loam, fine sandy loam.	SM-SC, GM-GC	A-2, A-4	0-5	55-90	50-85	35-60	20-40	20-25	5-10
	18-29	Gravelly fine sandy loam.	SM, GM	A-2, A-1	0-5	55-75	50-75	35-55	20-35	15-25	NP-5
	29	Indurated--------	---	---	---	---	---	---	---	---	---
24--------------- Falcon	0-7	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0-5	95-100	80-100	65-85	35-55	15-25	NP-10
	7-17	Sandy loam, fine sandy loam, gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-15	75-95	70-90	40-65	20-35	15-25	NP-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
25--------------- Falcon	0-7	Gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-10	65-80	60-75	35-45	20-30	15-25	NP-10
	7-17	Sandy loam, fine sandy loam, gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-15	75-95	70-90	40-65	20-35	15-25	NP-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
26*: Falcon----------	0-7	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0-5	95-100	80-100	65-85	35-55	15-25	NP-10
	7-17	Sandy loam, fine sandy loam, gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-15	75-95	70-90	40-65	20-35	15-25	NP-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bond------------	0-5	Loam-------------	SM-SC, CL-ML	A-4	0	95-100	90-100	70-85	40-55	20-25	5-10
	5-13	Loam, sandy clay loam.	CL	A-6	0-10	90-100	85-95	75-90	60-80	25-35	10-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
27*: Falcon----------	0-7	Gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-10	65-80	60-75	35-45	20-30	15-25	NP-10
	7-17	Sandy loam, fine sandy loam, gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-15	75-95	70-90	40-65	20-35	15-25	NP-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27*:											
Bond	0-5	Loam	SM-SC, CL-ML	A-4	0	95-100	90-100	70-85	40-55	20-25	5-10
	5-13	Loam, silty clay loam.	CL	A-6	0-10	90-100	85-95	75-90	60-80	25-35	10-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
28 Flygare	0-23	Loam	SM-SC, CL-ML	A-4	0-10	75-95	75-90	60-85	40-75	20-30	5-10
	23-36	Stony loam, very cobbly loam, very stony sandy loam.	SM-SC, GM-GC	A-2, A-4	35-55	50-85	45-80	30-65	15-50	20-30	5-10
	36-46	Very stony clay loam, very cobbly sandy clay loam, very cobbly sandy loam.	SM-SC, SC, GM-GC, GC	A-2, A-4, A-6	40-55	50-70	45-65	25-55	15-45	25-35	5-15
	46-60	Very cobbly sandy loam, cobbly loamy sand.	SP-SM, SM	A-1	20-25	65-75	60-70	30-40	10-20	15-20	NP-5
29 Flygare	0-26	Loam	SM-SC, CL-ML	A-4	0-10	75-95	75-90	60-85	40-75	20-30	5-10
	26-34	Stony loam, very cobbly loam, very stony sandy loam.	SM-SC, GM-GC	A-2, A-4	35-55	50-85	45-80	30-65	15-50	20-30	5-10
	34-42	Very cobbly sandy loam, cobbly loamy sand.	SP-SM, SM	A-1	20-25	65-75	60-70	30-40	10-20	15-20	NP-5
	42-60	Sandy loam, loam, sandy clay loam.	SM-SC, CL-ML	A-4	0-10	90-100	85-95	75-85	35-60	20-35	5-10
30 Frolic	0-34	Loam	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	20-35	5-15
	34-60	Fine sandy loam, loam.	CL-ML, SM-SC	A-4	0	100	100	60-95	35-75	20-30	5-10
31 Fughes	0-8	Loam	ML, SM	A-4	0-5	90-100	80-100	70-95	40-75	20-30	NP-5
	8-38	Clay, clay loam, silty clay loam.	CL	A-7, A-6	0-5	90-100	80-100	75-100	60-95	35-50	15-30
	38-60	Clay loam, sandy clay.	CL	A-6, A-7	0-5	90-100	80-100	75-100	60-80	25-45	10-30
32*. Gullied land											
33 Hagerman	0-3	Very fine sandy loam.	ML	A-4	0	100	100	85-95	50-65	15-25	NP-5
	3-8	Very fine sandy loam.	CL-ML	A-4	0	100	100	85-95	50-65	20-30	5-10
	8-33	Sandy clay loam	CL-ML, SM-SC, SC CL	A-4, A-6	0	100	100	80-90	40-55	25-35	5-15
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
34----------- Hangdo	0-11	Loam-------------	CL-ML, SM-SC	A-4	0-10	90-100	80-100	70-85	45-65	20-30	5-10
	11-35	Loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-15	90-100	80-100	60-80	45-65	25-40	5-15
	35-60	Cobbly sandy clay loam, cobbly clay loam.	CL, SC	A-6, A-7	15-30	75-90	70-80	65-75	40-70	30-45	10-20
35----------- Hangdo	0-9	Cobbly loam------	CL-ML, SM-SC	A-4	15-25	85-95	70-90	60-75	40-60	20-30	5-10
	9-16	Loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-15	90-100	80-100	60-80	45-65	25-40	5-15
	16-23	Cobbly sandy clay loam, cobbly clay loam.	CL, SC	A-6, A-7	15-30	75-90	70-80	65-75	40-70	30-45	10-20
	23-60	Very cobbly sandy clay loam, very cobbly sandy loam.	SM-SC	A-2, A-1	40-50	70-80	55-70	40-55	20-30	20-30	5-10
36----------- Harpole	0-2	Very cobbly loam	GM-GC, GC	A-2, A-4, A-6	45-55	55-65	50-60	40-55	20-45	25-35	5-15
	2-15	Cobbly loam, cobbly sandy loam.	SM-SC	A-2, A-4	15-30	90-95	70-90	50-75	30-50	25-30	5-10
	15-38	Very gravelly clay loam, very cobbly clay loam, very cobbly sandy clay loam.	GC	A-2, A-6	20-40	45-65	40-60	35-55	30-50	30-40	10-15
	38-60	Very cobbly sand, very cobbly loamy sand, very gravelly sandy loam.	GP-GM, GP	A-1	30-55	35-55	30-50	20-30	0-10	15-20	NP-5
37----------- Herm	0-8	Clay loam--------	CL	A-6	0-10	85-100	80-95	70-95	55-75	30-40	10-15
	8-14	Clay loam--------	CL	A-6	0-5	90-100	85-100	75-100	60-80	35-40	10-15
	14-60	Clay, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	60-95	35-50	15-25
38*: Herm----------	0-4	Stony loam-------	CL-ML	A-4	10-25	80-95	75-90	60-85	45-60	25-30	5-10
	4-10	Clay loam--------	CL	A-6	0-5	90-100	85-100	75-100	60-80	35-40	10-15
	10-60	Clay, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	60-95	35-50	15-25
Iles----------	0-2	Stony loam-------	GM-GC, SM-SC, CL-ML	A-4	5-15	65-85	60-75	50-65	35-60	20-35	5-10
	2-7	Clay loam--------	CL, ML	A-6	0	95-100	90-100	85-100	80-90	35-40	10-20
	7-32	Silty clay, silty clay loam.	CL, CH	A-6, A-7	0	95-100	90-100	85-100	70-95	35-55	15-30
	32-60	Silty clay loam	ML, CL	A-6, A-7	0	95-100	90-100	85-100	80-95	35-45	10-20
39*: Herm----------	0-4	Stony loam-------	CL-ML	A-4	10-25	80-95	75-90	60-85	45-60	25-30	5-10
	4-10	Clay loam--------	CL	A-6	0-5	90-100	85-100	75-100	60-80	35-40	10-15
	10-60	Clay, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	60-95	35-50	15-25

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
39*:											
Tomasaki	0-11	Loam	SM-SC, SC	A-4, A-6	0-10	80-100	75-95	65-90	45-70	20-35	5-15
	11-19	Clay, clay loam	CL	A-6, A-7	0-5	80-95	75-90	70-90	55-85	35-50	15-30
	19-43	Very cobbly clay loam, very cobbly clay.	GC	A-6, A-7	30-40	55-65	50-60	45-60	35-50	35-50	15-30
Falcon	0-7	Gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-10	65-80	60-75	35-45	20-30	15-25	NP-10
	7-17	Sandy loam, fine sandy loam, gravelly sandy loam.	SM-SC, SM	A-1, A-2	5-15	75-95	70-90	40-65	20-35	15-25	NP-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
40 Hoskinnini	0-2	Very gravelly fine sandy loam.	GM-GC	A-2	0	35-55	30-50	20-35	10-20	20-30	5-10
	2-7	Loam	CL-ML	A-4	0	100	95-100	80-95	65-75	25-35	5-10
	7-16	Cobbly clay loam, cobbly loam.	CL	A-6	25-45	90-100	85-95	70-90	50-70	30-40	10-15
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
41*, 42*:											
Ignacio	0-2	Fine sandy loam	SM-SC, CL-ML, SM ML	A-4	0	100	100	70-85	40-55	20-25	NP-10
	2-32	Fine sandy loam	SM-SC, CL-ML, SM ML	A-4	0	100	100	75-90	40-60	20-30	NP-10
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Leanto	0-15	Fine sandy loam	SM-SC, SM, CL-ML, ML	A-4	0	100	100	70-85	40-55	20-30	NP-10
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
43 Jocity	0-10	Loam	CL-ML, ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	10-17	Sandy loam	SM-SC	A-4	0	100	100	60-70	35-45	20-25	5-10
	17-29	Clay loam, loam	ML	A-6	0	100	100	90-100	70-80	35-40	10-15
	29-35	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	100	60-70	30-40	20-25	NP-5
	35-60	Loam, clay loam	CL	A-6	0	100	100	85-95	60-80	30-35	10-15
44*:											
Kilfoil Variant	0-7	Cobbly loam	SM-SC	A-4	10-15	90-95	80-85	65-70	40-50	20-25	5-10
	7-29	Clay loam	CL-ML, CL	A-4, A-6	0-10	90-100	80-100	70-95	60-80	25-40	5-15
	29-46	Cobbly clay loam	CL-ML, CL	A-4, A-6	10-15	90-95	80-85	70-80	50-70	25-40	5-15
	46-60	Cobbly loam	SM-SC	A-4	10-30	85-95	70-85	60-70	40-50	20-30	5-10
Hangdo	0-11	Loam	CL-ML, SM-SC	A-4	0-10	90-100	80-100	70-85	45-65	20-30	5-10
	11-35	Loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-15	90-100	80-100	60-80	45-65	25-40	5-15
	35-60	Cobbly sandy clay loam, cobbly clay loam.	CL, SC	A-6, A-7	15-30	75-90	70-80	65-75	40-70	30-45	10-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
44*:											
Harpole Variant-	0-5	Cobbly loam------	SM-SC, SM, ML, CL-ML	A-4	25-35	75-85	70-80	60-70	40-60	20-30	NP-10
	5-28	Very gravelly sandy clay loam.	GC	A-2	10-15	35-45	30-40	25-30	10-15	30-40	15-25
	28-60	Extremely gravelly sandy clay loam.	GP, GP-GC	A-2	25-35	15-35	10-30	5-25	0-10	20-35	5-20
45, 46----------- Leighcan	0-8	Cobbly loam------	SM-SC, SM	A-4	15-30	75-90	70-85	50-65	40-50	15-25	NP-10
	8-16	Gravelly coarse sandy loam, cobbly loam.	GM-GC, GM, SM-SC, SM	A-2, A-4	10-30	65-80	65-80	35-55	25-45	15-25	NP-10
	16-37	Very gravelly coarse sandy loam.	GM	A-1	15-30	45-55	40-55	15-25	10-20	15-25	NP-5
	37-60	Very cobbly coarse sandy loam.	SM	A-1	30-45	60-70	55-65	20-25	15-20	15-25	NP-5
47*:											
Lithic Torriorthents--	0-8	Sandy loam-------	SC, SM-SC, CL, CL-ML	A-4, A-6	0-15	85-90	75-80	50-65	35-60	20-35	5-15
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Badland.											
Rock outcrop.											
48*:											
Lithic Ustic Torriorthents--	0-2	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0-5	80-100	75-100	65-90	35-60	15-25	NP-10
	2-14	Stratified gravelly sandy clay loam to gravelly loamy sand.	SM, SM-SC, SC	A-1, A-2, A-4	0-15	70-90	65-85	35-85	20-40	20-30	NP-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Badland.											
Rock outcrop.											
49---------------- Meredith	0-7	Stony loam-------	SM	A-4	20-40	70-80	65-75	50-60	40-45	25-35	NP-10
	7-21	Very cobbly loam, extremely cobbly sandy clay loam.	GM-GC, GC, SM-SC, SC	A-2, A-4, A-6	40-55	30-70	25-65	20-50	10-40	25-35	5-15
	21-60	Fragmental material.	GP	A-2	70-80	0-15	0-10	0	0	---	---
50, 51----------- Mido	0-27	Loamy fine sand	SM	A-2, A-4	0	100	100	75-95	30-50	---	NP
	27-60	Loamy fine sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	100	70-95	5-35	---	NP

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
52---------------Mivida	0-4	Fine sandy loam	SM	A-4	0	100	100	90-100	35-45	15-20	NP-5
	4-15	Very fine sandy loam, fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	90-100	35-60	15-25	NP-10
	15-43	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	100	100	70-95	35-55	15-25	NP-10
	43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
53---------------Moab	0-3	Gravelly fine sandy loam.	SM-SC, GM-GC	A-2, A-4	0-10	60-80	50-75	30-60	25-40	20-25	5-10
	3-10	Gravelly fine sandy loam.	SM-SC	A-2, A-4	10-15	70-90	60-75	45-65	30-45	20-25	5-10
	10-60	Very gravelly fine sandy loam.	GM, GM-GC, SM, SM-SC	A-2	15-30	40-60	35-50	25-45	15-30	15-25	NP-10
54---------------Moab	0-2	Very cobbly fine sandy loam.	SM-SC, GM-GC	A-2	30-45	45-70	40-60	25-50	15-35	20-25	5-10
	2-10	Gravelly fine sandy loam.	SM-SC	A-2, A-4	10-15	70-90	60-75	45-65	30-45	20-25	5-10
	10-60	Very gravelly fine sandy loam.	GM, GM-GC, SM, SM-SC	A-2	15-30	40-60	35-50	25-45	15-30	15-25	NP-10
55*:											
Moab------------	0-3	Gravelly fine sandy loam.	SM-SC, GM-GC	A-2, A-4	0-10	60-80	50-75	30-60	25-40	20-25	5-10
	3-10	Gravelly fine sandy loam.	SM-SC	A-2, A-4	10-15	70-90	60-75	45-65	30-45	20-25	5-10
	10-60	Very gravelly fine sandy loam.	GM, GM-GC, SM, SM-SC	A-2	15-30	40-60	35-50	25-45	15-30	15-25	NP-10
Rizno-----------	0-2	Gravelly fine sandy loam.	SM-SC, SM, GM-GC, GM	A-2, A-4, A-1	0-10	55-80	50-75	35-55	20-40	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
56---------------Moenkopie	0-1	Very gravelly sandy loam.	GM-GC, GM	A-1, A-2	0-10	35-50	30-45	15-30	10-15	15-25	NP-10
	1-3	Sandy loam, fine sandy loam.	SM-SC, SM	A-2, A-4	0-5	80-100	75-100	45-70	25-40	15-25	NP-10
	3	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
57*:											
Moenkopie-------	0-3	Gravelly loamy sand.	SM, GM	A-1	0	55-80	50-75	25-40	10-25	---	NP
	3-8	Sandy loam, fine sandy loam.	SM-SC, SM	A-2, A-4	0-5	80-100	75-100	45-70	25-40	15-25	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
58---------------Nakai	0-17	Fine sand--------	SM	A-2	0	100	100	75-100	15-25	---	NP
	17-60	Fine sandy loam, very fine sandy loam.	ML, SM, CL-ML, SM-SC	A-4	0	100	100	70-100	45-65	15-25	NP-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
59, 60----------- Namon	0-8	Gravelly loam----	GM-GC, CL-ML	A-4	0	65-80	60-75	50-65	40-55	20-30	5-10
	8-14	Loam-------------	CL-ML	A-4	0	85-100	80-95	70-90	60-70	20-30	5-10
	14-25	Gravelly loam, gravelly sandy loam.	SM-SC, CL-ML	A-2, A-4	0-15	70-80	60-75	45-70	25-55	20-30	5-10
	25-60	Very cobbly loam, very cobbly sandy loam.	SM-SC, SM, GM-GC, GM	A-1, A-2, A-4	30-40	55-75	50-70	30-60	15-40	20-35	NP-10
61--------------- Nepalto	0-5	Gravelly sandy loam.	SM	A-1, A-2	5-15	75-85	65-75	40-50	20-30	15-25	NP-5
	5-60	Stratified extremely stony fine sand to gravelly fine sandy loam.	SM, SP-SM, GM, GP-GM	A-1	25-65	35-60	20-45	15-40	5-20	---	NP
62--------------- Nepalto	0-3	Very stony sandy loam.	GM	A-1	40-50	45-55	40-50	25-35	10-20	15-25	NP-5
	3-60	Stratified extremely stony fine sand to gravelly fine sandy loam.	SM, SP-SM, GM, GP-GM	A-1	25-65	35-60	20-45	15-40	5-20	---	NP
63--------------- Newsrock	0-17	Loamy fine sand	SM	A-2	0	100	100	95-100	10-25	---	NP
	17-31	Fine sandy loam	SM	A-2	0	100	95-100	90-95	25-35	20-25	NP-5
	31-46	Sandy clay loam, fine sandy loam, very fine sandy loam.	CL-ML, SM-SC, CL, SC	A-4, A-6	0	100	95-100	80-90	35-60	20-35	5-15
	46-60	Loamy sand-------	SM	A-2	0	100	75-85	50-60	10-20	---	NP
64, 65----------- Redbank	0-2	Fine sandy loam	SM, SM-SC	A-4	0	100	100	80-95	35-50	15-25	NP-10
	2-60	Stratified fine sandy loam to loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	70-95	40-70	15-30	NP-10
66, 67----------- Redbank	0-4	Fine sandy loam	SM, SM-SC	A-4	0	100	100	80-95	35-50	15-25	NP-10
	4-60	Stratified fine sandy loam to loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	70-95	40-70	15-30	NP-10
68--------------- Redbank	0-4	Very fine sandy loam.	CL-ML, ML	A-4	0	100	100	80-95	50-65	15-25	NP-10
	4-60	Stratified fine sandy loam to loamy fine sand.	SM-SC, SM	A-2, A-4	0	100	100	50-70	15-40	15-25	NP-10
69*:											
Richens---------	0-7	Silt loam--------	CL-ML	A-4	0-5	90-100	85-95	75-85	60-70	20-35	5-10
	7-19	Gravelly silty clay loam.	CL-ML, CL	A-4, A-6	10-15	70-80	65-75	55-65	55-65	20-35	5-15
	19-38	Clay-------------	CL	A-7	0-10	85-95	80-90	70-80	60-70	40-50	20-25
	38-60	Gravelly clay----	GC, CL	A-7	10-15	55-75	50-70	45-65	40-55	50-60	25-30
Herd------------	0-4	Very stony loam	GM-GC, GC	A-4, A-6	30-50	55-70	50-65	40-55	35-45	25-35	5-15
	4-21	Stony clay loam	SC, CL, GC	A-6	15-30	70-80	65-75	55-70	45-55	30-40	10-20
	21-60	Clay-------------	CL, CH	A-7	0-5	95-100	90-100	80-100	70-95	40-55	20-35

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
70*:											
Rizno-----------	0-2	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	80-100	75-100	55-85	35-55	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
71*:											
Rizno-----------	0-2	Gravelly fine sandy loam.	SM-SC, SM, GM-GC, GM	A-2, A-4, A-1	0-10	55-80	50-75	35-55	20-40	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
72*.											
Rock outcrop											
73*:											
Rock outcrop.											
Moenkopie-------	0-3	Gravelly loamy sand.	SM, GM	A-1	0	55-80	50-75	25-40	10-25	---	NP
	3-8	Sandy loam, fine sandy loam.	SM-SC, SM	A-2, A-4	0-5	80-100	75-100	45-70	25-40	15-25	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
74*:											
Rock outcrop.											
Rizno-----------	0-2	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	80-100	75-100	55-85	35-55	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
75*:											
Rock outcrop.											
Rizno-----------	0-2	Gravelly fine sandy loam.	SM-SC, SM, GM-GC, GM	A-2, A-4, A-1	0-10	55-80	50-75	35-55	20-40	15-25	NP-10
	2-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-10	95-100	90-100	65-85	35-55	15-30	NP-10
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
76*:											
Rock outcrop.											

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
76*: Ustic Torripsamments	0-3	Fine sand	SM	A-2, A-4	0	100	100	60-75	15-50	---	NP
	3-34	Sand, fine sand, loamy fine sand.	SM	A-2, A-4	0	100	100	60-75	15-50	---	NP
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
77*. Rubble land											
78 Sedillo	0-7	Very stony fine sandy loam.	SM-SC, GM-GC	A-2, A-4	30-55	50-75	45-60	35-55	25-45	20-30	5-10
	7-12	Very cobbly sandy clay loam, very cobbly clay loam, very cobbly loam.	SM-SC, SM, GM-GC, GC	A-6, A-4	30-55	50-75	45-60	40-55	35-50	25-35	5-15
	12-60	Very cobbly fine sandy loam, very cobbly loamy fine sand.	SM-SC, SM, GM-GC, GM	A-2, A-1	30-55	50-75	45-60	25-45	20-35	15-25	NP-10
79*: Shalako	0-2	Gravelly fine sandy loam.	SM-SC, SM	A-1, A-2	0-10	70-90	55-75	45-65	20-35	15-25	NP-10
	2-13	Gravelly loam, gravelly sandy loam, cobbly loam.	SM-SC, SM	A-1, A-2, A-4	5-20	80-90	55-75	45-70	20-50	15-25	NP-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Anasazi	0-9	Gravelly loam	SM, GM-GC, GM	A-2, A-4, A-1	0-15	55-80	50-75	30-65	15-45	15-20	NP-5
	9-26	Gravelly loam, gravelly fine sandy loam.	SM, GM	A-2, A-4, A-1	0-10	55-80	50-75	35-65	20-45	15-20	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
80 Sheppard	0-3	Fine sand	SM	A-2	0	100	100	65-80	10-20	---	NP
	3-60	Loamy fine sand, fine sand, loamy sand.	SM	A-2	0	100	90-100	70-80	15-25	---	NP
81 Sirref	0-3	Loam	CL-ML	A-4	0-10	85-95	80-90	65-75	50-60	20-30	5-10
	3-15	Gravelly clay loam, gravelly clay.	GC, SC	A-6, A-7	5-15	60-75	55-70	45-60	35-50	35-45	15-20
	15-48	Very gravelly clay, very cobbly clay, extremely cobbly clay.	GC	A-2, A-7	20-45	45-60	35-50	30-45	25-40	40-50	20-25
	48-60	Very cobbly clay loam.	GC	A-2, A-6, A-7	35-50	45-55	40-50	40-50	30-45	35-45	10-20

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
82*:											
Sirref----------	0-3	Loam-------------	CL-ML	A-4	0-10	85-95	80-90	65-75	50-60	20-30	5-10
	3-15	Gravelly clay loam, gravelly clay.	GC, SC	A-6, A-7	5-15	60-75	55-70	45-60	35-50	35-45	15-20
	15-48	Very gravelly clay, very cobbly clay, extremely cobbly clay.	GC	A-2, A-7	20-45	45-60	35-50	30-45	25-40	40-50	20-25
	48-60	Very cobbly clay loam.	GC	A-2, A-6, A-7	35-50	45-55	40-50	40-50	30-45	35-45	10-20
Toone-----------	0-8	Loam-------------	SM-SC, CL-ML	A-4	0	90-100	80-95	55-85	45-70	20-30	5-10
	8-25	Loam, silt loam	SM-SC, CL-ML	A-4	0	90-100	80-95	55-85	45-70	20-30	5-10
	25-33	Gravelly clay loam.	SC, CL, GC	A-7	5-15	70-80	65-75	55-65	45-55	40-45	15-20
	33-60	Very gravelly clay, very stony clay.	GC	A-2	15-45	45-55	40-50	35-45	30-35	40-50	20-25
83--------------- Skylick	0-37	Loam-------------	CL-ML	A-4	0-5	95-100	90-100	80-95	65-75	20-30	5-10
	37-60	Cobbly sandy clay loam, cobbly clay loam, gravelly clay loam.	SC, CL	A-2, A-6	10-40	70-90	65-85	55-75	30-60	30-40	10-15
84*. Slickens											
85, 86----------- Strych	0-3	Very cobbly fine sandy loam.	SM, GM	A-2, A-1	30-45	45-70	40-60	25-50	15-35	20-25	NP-5
	3-10	Cobbly fine sandy loam.	SM-SC	A-2, A-4	20-30	70-90	65-85	50-70	30-50	20-25	5-10
	10-25	Very gravelly fine sandy loam, very gravelly sandy loam.	GM, SM	A-2, A-1	10-20	40-65	35-55	20-45	15-30	20-25	NP-5
	25-60	Very gravelly fine sandy loam, extremely gravelly loamy sand.	GM, GP-GM	A-2, A-1	15-20	30-60	25-50	20-45	5-30	---	NP
87--------------- Strych	0-8	Very cobbly fine sandy loam.	SM	A-2, A-4	15-30	70-90	65-85	45-60	30-40	15-20	NP-5
	8-27	Very cobbly fine sandy loam.	GM-GC, GC	A-2, A-4, A-6	30-55	50-65	45-60	30-50	20-40	20-35	5-15
	27-34	Fine sandy loam	SM, SM-SC	A-2, A-4	0-10	85-100	80-95	55-70	30-45	15-25	NP-10
	34-39	Very gravelly fine sandy loam.	GM	A-1	10-20	40-55	35-50	20-35	10-25	15-20	NP-5
	39-60	Very cobbly fine sandy loam, very stony sandy loam.	SM, SM-SC, GM, GM-GC	A-2, A-1	30-55	50-65	45-60	30-40	15-25	15-25	NP-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
88-------------- Thoroughfare	0-2	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	65-85	35-55	15-25	NP-10
	2-60	Stratified gravelly loamy sand to fine sandy loam.	SM, SM-SC	A-1, A-2, A-4	0	80-100	60-100	45-95	20-40	15-30	NP-10
89-------------- Thoroughfare	0-2	Loam------------	ML, CL-ML	A-4	0	90-100	85-100	70-95	55-75	15-25	NP-10
	2-60	Stratified fine sand to sandy clay loam.	SM, SM-SC	A-2, A-4	0-10	80-100	75-100	45-75	25-50	10-30	NP-10
90-------------- Tolman Variant	0-10	Loam------------	CL-ML	A-4	0-10	90-100	85-95	70-80	55-65	20-30	5-10
	10-17	Very cobbly sandy clay loam, very gravelly clay loam.	GM-GC, SM-SC, SC, GC	A-2, A-4, A-6	30-60	45-75	35-70	30-65	15-50	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
91-------------- Tomasaki	0-11	Loam------------	SM-SC, SC	A-4, A-6	0-10	80-100	75-95	65-90	45-70	20-35	5-15
	11-34	Clay, clay loam	CL	A-6, A-7	0-5	80-95	75-90	70-90	55-85	35-50	15-30
	34-50	Cobbly clay loam	CL	A-6	10-20	65-90	60-85	55-75	50-70	30-45	10-20
	50-60	Cobbly clay loam	CL	A-6	10-20	65-90	60-85	55-75	50-70	30-45	10-20
92-------------- Tomasaki	0-6	Loam------------	SM-SC, SC	A-4, A-6	0-10	80-100	75-95	65-90	45-70	20-35	5-15
	6-39	Clay, clay loam	CL	A-6, A-7	0-5	80-95	75-90	70-90	55-85	35-50	15-30
	39-60	Cobbly clay loam	CL	A-6	10-20	65-90	60-85	55-75	50-70	30-45	10-20
93-------------- Toone	0-22	Loam------------	CL-ML	A-4	0-10	90-100	85-100	70-95	55-75	20-30	5-10
	22-31	Gravelly loam----	SM-SC, GM-GC, CL-ML	A-4	5-15	65-90	60-85	50-70	35-55	25-30	5-10
	31-49	Very gravelly clay loam, very cobbly clay loam, very gravelly clay.	GC, GM	A-2, A-6, A-7	15-40	40-60	35-55	25-45	20-40	35-45	10-25
	49-60	Gravelly clay loam, very gravelly clay loam, very cobbly clay loam.	GC, SC	A-2, A-6	15-30	40-70	35-65	30-55	20-40	30-40	10-20
94*:											
Toone-----------	0-8	Loam------------	SM-SC, CL-ML	A-4	0	90-100	80-95	55-85	45-70	20-30	5-10
	8-25	Loam, silt loam	SM-SC, CL-ML	A-4	0	90-100	80-95	55-85	45-70	20-30	5-10
	25-33	Gravelly clay loam.	SC, CL, GC	A-7	5-15	70-80	65-75	55-65	45-55	40-45	15-20
	33-60	Very gravelly clay, very stony clay.	GC	A-2	15-45	45-55	40-50	35-45	30-35	40-50	20-25

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
94*:											
Sirref----------	0-9	Very cobbly loam	GM-GC, SM-SC	A-4	30-35	60-75	55-70	45-60	35-45	20-30	5-10
	9-21	Gravelly clay loam, gravelly clay.	GC, SC	A-6, A-7	5-15	60-75	55-70	45-60	35-50	35-45	15-20
	21-54	Very gravelly clay, very cobbly clay, extremely cobbly clay.	GC	A-2, A-7	20-45	45-60	35-50	30-45	25-40	40-50	20-25
	54-60	Very cobbly clay loam.	GC	A-2, A-6, A-7	35-50	45-55	40-50	40-50	30-45	35-45	10-20
Herm------------	0-8	Clay loam--------	CL	A-6	0-10	85-100	80-95	70-95	55-75	30-40	10-15
	8-14	Clay loam--------	CL	A-6	0-5	90-100	85-100	75-100	60-80	35-40	10-15
	14-60	Clay, clay loam	CL	A-6, A-7	0-5	90-100	85-100	75-100	60-95	35-50	15-25
95--------------- Trail	0-3	Fine sand--------	SM	A-2	0	100	100	65-80	20-35	---	NP
	3-60	Stratified sand to fine sandy loam.	SM	A-2, A-4	0	100	100	55-80	10-45	15-25	NP-5
96--------------- Tukuhnik	0-7	Loam-------------	CL-ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	55-75	25-35	5-15
	7-13	Clay loam--------	CL	A-6	0-5	95-100	90-100	80-95	65-80	30-40	10-15
	13-41	Silty clay loam	CL	A-7, A-6	0-5	95-100	90-100	85-100	75-95	35-45	15-20
	41-51	Silty clay loam, silty clay.	CL	A-6, A-7	0-5	90-100	85-95	85-100	75-95	35-50	15-25
	51	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
97*:											
Ustic Torrifluvents--	0-13	Loamy very fine sand.	SM	A-4	0	100	100	100	40-50	---	NP
	13-60	Stratified gravelly sandy loam to silt loam.	SM-SC, SM, ML, CL-ML	A-4	0-15	70-80	65-75	50-65	40-55	20-30	NP-10
Ustic Torrifluvents, sodic---------	0-3	Loamy very fine sand.	SM	A-4	0	100	100	100	40-50	---	NP
	3-60	Stratified gravelly sandy loam to silt loam.	SM-SC, SM, ML, CL-ML	A-4	0-15	70-80	65-75	50-65	40-55	20-30	NP-10
Typic Ustifluvents---	0-1	Loam-------------	CL-ML	A-4	0	100	100	85-100	60-75	25-30	5-10
	1-60	Stratified very gravelly sand to silt loam.	SM, SM-SC	A-2, A-1	0	90-100	45-60	35-45	15-35	15-25	NP-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
98---------------- Ustic Torriorthents	0-11	Very cobbly sandy loam.	SM, SM-SC, GM, GM-GC	A-1, A-2	30-55	60-70	40-60	30-40	15-35	15-25	NP-10
	11-30	Very gravelly sandy clay loam.	SM-SC, SC, GC, GM-GC	A-2	0-25	60-85	30-50	20-40	15-25	25-35	5-15
	30-45	Cobbly sandy clay loam.	SM-SC, SC	A-2, A-4, A-6	25-40	80-90	70-80	50-65	25-40	25-35	5-15
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---
99*:											
Ustic Torriorthents--	0-7	Very cobbly loamy fine sand.	SM, SP-SM	A-2, A-1	35-50	65-85	40-65	30-60	10-30	15-25	NP-5
	7-60	Extremely stony fine sandy loam, very stony fine sandy loam.	GM, GM-GC, SM, SM-SC	A-2	60-70	60-80	55-75	50-70	20-35	15-25	NP-10
Lithic Torriorthents--	0-17	Gravelly fine sandy loam.	SM, SM-SC	A-2, A-1, A-4	0-15	75-90	55-85	40-65	15-40	15-30	NP-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
100*:											
Ustic Torriorthents--	0-3	Very cobbly sandy loam.	SM, SP-SM	A-2, A-1	35-50	65-85	40-65	30-60	10-30	15-25	NP-5
	3-11	Very cobbly loam	SM-SC	A-2, A-4	35-50	65-85	40-65	30-50	25-40	20-30	5-10
	11-30	Very gravelly sandy clay loam.	SM-SC, SC	A-1, A-2	0-25	60-85	30-50	20-40	15-25	25-35	5-15
	30-45	Cobbly sandy clay loam.	SM-SC, SC	A-2, A-4, A-6	15-40	80-90	70-80	50-65	25-40	25-35	5-15
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ustollic Calciorthids---	0-1	Gravelly fine sandy loam.	SM, SM-SC	A-2, A-1	0-10	75-90	50-75	45-70	20-35	15-30	NP-10
	1-8	Fine sandy loam, loam.	ML, CL-ML, SM, SM-SC	A-4	0-10	90-100	85-100	75-90	40-65	15-30	NP-10
	8-32	Gravelly loam----	SM-SC	A-4	0-10	80-90	65-80	60-75	40-50	20-30	5-10
	32-40	Clay loam, sandy clay loam.	ML, CL	A-6, A-7	0-5	95-100	90-100	85-95	50-75	35-45	10-20
	40	Weathered bedrock	---	---	---	---	---	---	---	---	---
101*:											
Ustic Torriorthents--	0-3	Very cobbly sandy loam.	SM, SP-SM	A-2, A-1	35-50	65-85	40-65	30-60	10-30	15-25	NP-5
	3-11	Very cobbly loam	SM-SC	A-2, A-4	35-50	65-85	40-65	30-50	25-40	20-30	5-10
	11-30	Very gravelly sandy clay loam.	SM-SC, SC	A-1, A-2	0-25	60-85	30-50	20-40	15-25	25-35	5-15
	30-45	Cobbly sandy clay loam.	SM-SC, SC	A-2, A-4, A-6	15-40	80-90	70-80	50-65	25-40	25-35	5-15
	45	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
101*:											
Ustollic Haplargids	0-8	Stony sandy loam	SM, SM-SC	A-2, A-4	25-35	75-90	70-85	60-75	30-40	15-25	NP-10
	8-24	Stony sandy clay loam, stony clay loam.	SC	A-6	25-35	85-95	70-80	60-75	35-50	25-40	10-20
	24-60	Stony silty clay loam.	CL	A-6	25-35	75-90	70-90	70-90	60-80	30-35	10-15
102 Waas	0-10	Very fine sandy loam.	CL-ML	A-4	0	100	100	85-95	60-75	20-30	5-10
	10-60	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
103 Windwhistle	0-2	Very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	90-100	45-60	15-25	NP-10
	2-25	Very fine sandy loam, fine sandy loam.	SM-SC, CL-ML	A-4	0	100	100	85-100	40-60	20-30	5-10
	25-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
104*:											
Windwhistle	0-2	Very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	90-100	45-60	15-25	NP-10
	2-25	Very fine sandy loam, fine sandy loam.	SM-SC, CL-ML	A-4	0	100	100	85-100	40-60	20-30	5-10
	25-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sazi	0-3	Very fine sandy loam.	SM, SM-SC	A-4	0	100	100	90-100	40-50	15-25	NP-10
	3-21	Fine sandy loam, very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	70-95	40-60	15-25	NP-10
	21-31	Fine sandy loam, very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	65-95	35-65	15-25	NP-10
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
1*:												
Arches----------	0-4	2-4	1.45-1.60	6.0-20	0.06-0.08	7.4-8.4	<2	Low-------	0.28	1	1	.5-1
	4-19	2-6	1.45-1.60	6.0-20	0.06-0.08	7.4-8.4	<2	Low-------	0.28			
	19	---	---	---	---	---	---	----------	----			
Sheppard--------	0-3	2-5	1.50-1.60	6.0-20	0.05-0.07	7.4-8.4	<2	Low-------	0.20	5	1	<.5
	3-60	3-8	1.50-1.60	6.0-20	0.06-0.08	7.4-9.0	<2	Low-------	0.20			
Rock outcrop.												
2*. Badland												
3---------------- Barnum	0-3	16-20	1.20-1.30	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low-------	0.43	5	4L	1-3
	3-60	18-29	1.20-1.45	0.2-0.6	0.10-0.16	7.4-9.0	<2	Moderate	0.37			
4---------------- Barnum	0-3	16-20	1.20-1.30	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low-------	0.43	5	4L	1-3
	3-60	18-30	1.20-1.40	0.2-0.6	0.10-0.16	7.4-9.0	<2	Moderate	0.37			
5---------------- Barnum	0-3	28-35	1.10-1.20	0.06-0.2	0.17-0.19	7.9-8.4	<2	Moderate	0.37	4	4L	1-3
	3-43	27-35	1.15-1.30	0.2-0.6	0.16-0.19	7.9-9.0	8-16	Moderate	0.37			
	43-62	4-10	1.40-1.50	>6.0	0.06-0.09	7.9-9.0	4-8	Low-------	0.49			
6---------------- Barx	0-2	10-18	1.25-1.35	2.0-6.0	0.14-0.16	7.4-8.4	<2	Low-------	0.43	5	3	1-3
	2-18	10-18	1.40-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low-------	0.28			
	18-29	20-35	1.30-1.40	0.6-2.0	0.17-0.18	7.4-8.4	<2	Moderate	0.28			
	29-60	10-18	1.40-1.50	2.0-6.0	0.11-0.14	7.9-9.0	<2	Moderate	0.28			
7---------------- Begay	0-3	8-15	1.40-1.50	2.0-6.0	0.09-0.14	7.9-8.4	<2	Low-------	0.43	5	3	1-3
	3-42	12-18	1.40-1.50	2.0-6.0	0.13-0.18	7.9-9.0	<2	Low-------	0.43			
	42-60	5-12	1.40-1.50	2.0-6.0	0.10-0.15	7.9-9.0	<2	Low-------	0.37			
8---------------- Begay	0-3	8-15	1.40-1.50	2.0-6.0	0.09-0.14	7.9-8.4	<2	Low-------	0.43	5	3	1-3
	3-32	12-18	1.40-1.50	2.0-6.0	0.13-0.18	7.9-9.0	<2	Low-------	0.43			
	32-60	5-12	1.40-1.50	2.0-6.0	0.10-0.15	7.9-9.0	<2	Low-------	0.37			
9*:												
Begay-----------	0-4	2-10	1.40-1.50	2.0-6.0	0.08-0.11	7.9-8.4	<2	Low-------	0.49	5	2	1-3
	4-60	12-18	1.40-1.50	2.0-6.0	0.13-0.18	7.9-9.0	<2	Low-------	0.43			
Rizno-----------	0-2	10-17	1.20-1.40	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-------	0.28	1	3	.5-1
	2-8	10-18	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
10*:												
Begay-----------	0-3	8-15	1.40-1.50	2.0-6.0	0.09-0.14	7.9-8.4	<2	Low-------	0.43	5	3	1-3
	3-32	12-18	1.40-1.50	2.0-6.0	0.13-0.18	7.9-9.0	<2	Low-------	0.43			
	32-60	5-12	1.40-1.50	2.0-6.0	0.10-0.15	7.9-9.0	<2	Low-------	0.37			
Rock outcrop.												
Mido------------	0-27	2-10	1.40-1.50	6.0-20	0.08-0.10	7.9-9.0	<2	Low-------	0.37	5	2	<1
	27-60	3-8	1.40-1.50	6.0-20	0.05-0.09	7.9-9.0	<2	Low-------	0.32			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
11 Bluechief	0-3	5-8	1.40-1.50	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low	0.37	3	3	.5-1
	3-25	10-15	1.40-1.50	2.0-6.0	0.11-0.13	7.9-9.0	<2	Low	0.43			
	25-38	12-18	1.40-1.50	2.0-6.0	0.11-0.14	8.5-9.0	<2	Low	0.43			
	38	---	---	---	---	---	---	---	---			
12*:												
Bluechief	0-3	5-10	1.40-1.50	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low	0.37	3	3	.5-1
	3-25	10-15	1.40-1.50	2.0-6.0	0.11-0.13	7.9-9.0	<2	Low	0.43			
	25-38	12-18	1.40-1.50	2.0-6.0	0.11-0.14	8.5-9.0	<2	Low	0.43			
	38	---	---	---	---	---	---	---	---			
Hanksville	0-2	35-40	1.35-1.45	<0.06	0.14-0.20	7.9-9.0	>8	Moderate	0.43	2	6	<.5
	2-37	35-45	1.25-1.35	<0.06	0.14-0.20	7.9-9.0	>8	High	0.43			
	37	---	---	---	---	---	---	---	---			
Leeko	0-2	7-9	1.35-1.45	6.0-20	0.08-0.10	7.9-8.4	<2	Low	0.37	1	2	.5-1
	2-14	24-27	1.30-1.40	0.2-0.6	0.16-0.18	>8.4	<8	Moderate	0.43			
	14-51	15-23	1.30-1.50	0.6-2.0	0.11-0.15	7.9-9.0	<8	Low	0.32			
	51-60	3-5	1.40-1.50	6.0-20	0.07-0.09	7.9-8.4	<8	Low	0.24			
13 Bluehon	0-5	13-15	1.35-1.45	2.0-6.0	0.07-0.09	7.4-8.4	<2	Low	0.20	2	8	1-3
	5-15	18-27	1.35-1.50	2.0-6.0	0.09-0.11	7.9-9.0	<2	Low	0.05			
	15-33	15-20	1.35-1.50	6.0-20	0.04-0.06	7.9-9.0	<2	Low	0.15			
	33	---	---	---	---	---	---	---	---			
14*:												
Bond	0-2	10-15	1.35-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low	0.28	1	3	1-3
	2-6	12-18	1.35-1.50	2.0-6.0	0.14-0.16	7.4-8.4	<2	Low	0.55			
	6-19	18-30	1.10-1.30	0.2-0.6	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
	19	---	---	---	---	---	---	---	---			
Rizno	0-2	10-17	1.20-1.40	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low	0.28	1	3	.5-1
	2-8	10-18	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low	0.28			
	8	---	---	---	---	---	---	---	---			
15*:												
Bond	0-5	10-15	1.35-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low	0.28	1	3	1-3
	5-13	18-30	1.10-1.30	0.2-0.6	0.16-0.19	7.4-8.4	<2	Low	0.37			
	13	---	---	---	---	---	---	---	---			
Windwhistle	0-2	8-13	1.40-1.50	2.0-6.0	0.14-0.16	7.4-8.4	<2	Low	0.49	3	3	1-3
	2-25	13-18	1.40-1.55	2.0-6.0	0.12-0.16	7.9-9.0	<2	Low	0.43			
	25-38	8-14	1.40-1.55	2.0-20	0.09-0.12	7.9-9.0	<2	Low	0.43			
	38	---	---	---	---	---	---	---	---			
16*:												
Bookcliff Variant	0-4	8-14	1.30-1.40	2.0-6.0	0.08-0.12	7.4-7.8	<2	Low	0.28	2	3	5-10
	4-10	18-25	1.35-1.45	0.6-2.0	0.13-0.17	7.4-7.8	<2	Moderate	0.32			
	10-27	25-35	1.45-1.55	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
	27	---	---	---	---	---	---	---	---			
Beje	0-7	20-27	1.20-1.30	0.6-2.0	0.15-0.17	6.6-8.4	<2	Moderate	0.28	1	6	3-5
	7-19	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
	19	---	---	---	---	---	---	---	---			
17 Broad Canyon	0-11	18-22	1.30-1.40	0.6-2.0	0.08-0.11	6.6-7.3	<2	Low	0.15	2	8	3-5
	11-30	16-20	1.40-1.50	2.0-6.0	0.05-0.08	6.1-6.5	<2	Low	0.10			
	30-60	6-14	1.50-1.60	6.0-20	0.02-0.05	6.1-6.5	<2	Low	0.05			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
18----------------- Broad Canyon	0-15	13-17	1.25-1.35	0.6-2.0	0.06-0.10	6.1-7.3	<2	Low--------	0.10	2	8	3-5
	15-32	15-19	1.35-1.45	0.6-2.0	0.06-0.10	6.1-7.3	<2	Low--------	0.15			
	32-60	16-20	1.35-1.45	2.0-6.0	0.03-0.07	6.1-7.3	<2	Low--------	0.05			
19----------------- Cahona	0-2	10-15	1.40-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.24	5	3	1-3
	2-20	20-35	1.30-1.40	0.2-0.6	0.15-0.17	6.6-8.4	<2	Moderate	0.37			
	20-60	10-27	1.40-1.50	0.6-2.0	0.13-0.16	7.9-9.0	<2	Low--------	0.37			
20----------------- Cataract	0-2	5-12	1.45-1.60	6.0-20	0.07-0.09	7.4-7.8	<2	Low--------	0.24	2	2	<.5
	2-9	18-32	1.20-1.35	0.2-0.6	0.12-0.18	7.9-9.0	<2	Moderate	0.37			
	9-33	16-25	1.20-1.35	0.6-2.0	0.12-0.17	7.4-9.0	<2	Low--------	0.43			
	33	---	---	---	---	---	---	-----------	----			
21*: Dranyon----------	0-13	16-20	1.40-1.50	2.0-6.0	0.09-0.17	5.6-7.3	<2	Low--------	0.28	3	3	5-7
	13-19	18-24	1.30-1.40	0.6-2.0	0.12-0.18	5.6-7.3	<2	Low--------	0.28			
	19-38	25-35	1.35-1.45	0.2-0.6	0.13-0.16	5.6-7.3	<2	Moderate	0.24			
	38-52	27-40	1.35-1.45	0.2-0.6	0.09-0.12	5.6-7.3	<2	Moderate	0.28			
	52	---	---	---	---	---	---	-----------	----			
Tolman Variant--	0-3	15-22	1.25-1.35	0.6-2.0	0.11-0.14	6.1-7.3	<2	Low--------	0.10	1	8	3-5
	3-8	18-28	1.25-1.35	2.0-6.0	0.04-0.06	6.1-7.3	<2	Low--------	0.05			
	8-17	20-28	1.40-1.50	0.6-2.0	0.06-0.08	6.1-7.3	<2	Low--------	0.05			
	17	---	---	---	---	---	---	-----------	----			
22*: Dumps.												
Pits.												
23----------------- Factory	0-2	10-15	1.35-1.45	2.0-6.0	0.08-0.12	7.4-8.4	<2	Low--------	0.17	2	8	1-3
	2-18	14-18	1.50-1.60	2.0-6.0	0.02-0.11	7.9-9.0	<2	Low--------	0.24			
	18-29	10-15	1.55-1.65	2.0-6.0	0.05-0.09	>7.8	<4	Low--------	0.17			
	29	---	---	---	---	---	---	-----------	----			
24----------------- Falcon	0-7	7-15	1.35-1.45	2.0-6.0	0.08-0.12	6.6-7.8	<2	Low--------	0.24	1	3	3-5
	7-17	5-18	1.45-1.55	2.0-6.0	0.07-0.11	6.6-9.0	<2	Low--------	0.17			
	17	---	---	---	---	---	---	-----------	----			
25----------------- Falcon	0-7	7-15	1.35-1.45	2.0-6.0	0.07-0.11	6.6-7.8	<2	Low--------	0.17	1	8	3-5
	7-17	5-18	1.45-1.55	2.0-6.0	0.07-0.11	6.6-9.0	<2	Low--------	0.17			
	17	---	---	---	---	---	---	-----------	----			
26*: Falcon-----------	0-7	7-15	1.35-1.45	2.0-6.0	0.08-0.12	6.6-7.8	<2	Low--------	0.24	1	3	3-5
	7-17	5-18	1.45-1.55	2.0-6.0	0.07-0.11	6.6-9.0	<2	Low--------	0.17			
	17	---	---	---	---	---	---	-----------	----			
Bond-------------	0-5	10-15	1.35-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.28	2	3	1-3
	5-13	18-30	1.10-1.30	0.2-0.6	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
27*: Falcon-----------	0-7	7-15	1.35-1.45	2.0-6.0	0.07-0.11	6.6-7.8	<2	Low--------	0.17	1	8	3-5
	7-17	5-18	1.45-1.55	2.0-6.0	0.07-0.11	6.6-9.0	<2	Low--------	0.17			
	17	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
27*:												
Bond------------	0-5	10-15	1.35-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.28	1	3	1-3
	5-13	18-30	1.10-1.30	0.2-0.6	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
	13	---	---	---	---	---	---	----------	----			
Rock outcrop.												
28--------------- Flygare	0-23	13-20	1.35-1.45	0.6-2.0	0.13-0.17	5.6-7.3	<2	Low--------	0.15	2	5	5-10
	23-36	15-25	1.40-1.55	0.6-2.0	0.06-0.13	6.1-7.3	<2	Low--------	0.17			
	36-46	17-30	1.40-1.55	0.6-2.0	0.05-0.11	5.6-7.3	<2	Moderate	0.10			
	46-60	4-12	1.50-1.60	6.0-20	0.05-0.09	6.6-7.3	<2	Low--------	0.10			
29--------------- Flygare	0-26	13-20	1.35-1.45	0.6-2.0	0.13-0.17	5.6-7.3	<2	Low--------	0.15	2	5	5-10
	26-34	15-25	1.40-1.55	0.6-2.0	0.06-0.13	6.1-7.3	<2	Low--------	0.17			
	34-42	4-12	1.50-1.60	6.0-20	0.05-0.09	6.6-7.3	<2	Low--------	0.10			
	42-60	15-25	1.40-1.60	0.6-6.0	0.11-0.18	6.6-7.3	<2	Low--------	0.24			
30--------------- Frolic	0-34	18-26	1.30-1.40	0.6-2.0	0.13-0.17	7.4-8.4	<2	Moderate	0.24	5	5	5-10
	34-60	18-22	1.45-1.55	0.6-2.0	0.11-0.17	7.4-8.4	<2	Low--------	0.43			
31--------------- Fughes	0-8	10-25	1.25-1.35	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.24	5	5	2-4
	8-38	35-60	1.15-1.25	0.06-0.2	0.15-0.17	6.6-7.8	<2	High-------	0.32			
	38-60	27-45	1.25-1.35	0.2-0.6	0.14-0.16	6.6-7.8	<2	High-------	0.28			
32*. Gullied land												
33--------------- Hagerman	0-3	8-12	1.30-1.40	2.0-6.0	0.15-0.17	7.9-8.4	<2	Low--------	0.43	2	3	1-3
	3-8	14-18	1.30-1.40	2.0-6.0	0.15-0.17	7.4-8.4	<2	Low--------	0.49			
	8-33	21-27	1.40-1.50	0.6-2.0	0.17-0.19	7.9-8.4	<2	Moderate	0.20			
	33	---	---	---	---	---	---	----------	----			
34--------------- Hangdo	0-11	15-20	1.25-1.35	0.6-2.0	0.15-0.17	7.4-7.8	<2	Low--------	0.32	3	6	3-5
	11-35	20-35	1.30-1.40	0.6-2.0	0.15-0.18	7.4-8.4	<2	Moderate	0.24			
	35-60	25-40	1.20-1.30	0.2-0.6	0.13-0.16	7.4-8.4	<2	Moderate	0.20			
35--------------- Hangdo	0-9	15-20	1.25-1.35	0.6-2.0	0.11-0.14	7.4-7.8	<2	Low--------	0.20	3	8	3-5
	9-16	20-35	1.30-1.40	0.6-2.0	0.15-0.18	7.4-8.4	<2	Moderate	0.24			
	16-23	25-40	1.20-1.30	0.2-0.6	0.13-0.16	7.4-8.4	<2	Moderate	0.20			
	23-60	15-25	1.35-1.45	0.6-2.0	0.10-0.14	7.4-8.4	<2	Moderate	0.17			
36--------------- Harpole	0-2	15-25	1.20-1.40	0.6-2.0	0.07-0.09	6.6-7.3	<2	Low--------	0.17	3	8	2-5
	2-15	14-22	1.40-1.60	0.6-2.0	0.09-0.12	6.6-7.8	<2	Low--------	0.20			
	15-38	25-35	1.40-1.60	0.2-0.6	0.09-0.12	6.6-7.8	<2	Moderate	0.10			
	38-60	0-5	1.40-1.60	6.0-20	0.03-0.05	6.6-7.8	<2	Low--------	0.05			
37--------------- Herm	0-8	27-35	1.30-1.40	0.2-0.6	0.16-0.18	6.1-7.8	<2	Low--------	0.24	5	6	3-5
	8-14	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	Low--------	0.28			
	14-60	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	Moderate	0.28			
38*:												
Herm------------	0-4	18-24	1.30-1.40	0.6-2.0	0.12-0.15	6.1-7.8	<2	Low--------	0.17	5	6	3-5
	4-10	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	Low--------	0.28			
	10-60	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	Moderate	0.28			
Iles------------	0-2	13-27	1.30-1.40	0.6-2.0	0.10-0.13	7.4-8.4	<2	Low--------	0.20	5	8	3-5
	2-7	30-35	1.25-1.35	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.32			
	7-32	35-50	1.25-1.35	0.06-0.2	0.16-0.18	7.4-8.4	<2	High-------	0.32			
	32-60	30-40	1.25-1.40	0.06-0.2	0.16-0.18	7.9-9.0	<2	High-------	0.32			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
39*:												
Herm-------------	0-4	18-24	1.30-1.40	0.6-2.0	0.12-0.15	6.1-7.8	<2	Low--------	0.17	5	6	3-5
	4-10	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	Low--------	0.28			
	10-60	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	Moderate	0.28			
Tomasaki---------	0-11	16-27	1.35-1.45	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.20	4	5	5-10
	11-19	35-45	1.40-1.55	0.06-0.2	0.16-0.18	6.6-7.8	<2	Moderate	0.20			
	19-60	35-45	1.45-1.55	0.06-0.2	0.12-0.16	6.6-7.8	<2	Moderate	0.15			
Falcon-----------	0-7	7-15	1.35-1.45	2.0-6.0	0.07-0.11	6.6-7.8	<2	Low--------	0.17	1	8	3-5
	7-17	5-18	1.45-1.55	2.0-6.0	0.07-0.11	6.6-9.0	<2	Low--------	0.17			
	17	---	---	---	---	---	---	-----------	----			
40---------------- Hoskinnini	0-2	16-20	1.35-1.45	2.0-6.0	0.05-0.09	8.5-9.0	<2	Low--------	0.15	1	8	.5-1
	2-7	22-26	1.30-1.40	0.6-2.0	0.13-0.17	8.5-9.0	<2	Low--------	0.43			
	7-16	25-35	1.30-1.40	0.6-2.0	0.08-0.14	>8.4	<2	Moderate	0.20			
	16	---	---	---	---	---	---	-----------	----			
41*, 42*:												
Ignacio----------	0-2	10-15	1.25-1.35	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low--------	0.37	3	3	1-3
	2-32	10-18	1.30-1.40	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low--------	0.43			
	32	---	---	---	---	---	---	-----------	----			
Leanto-----------	0-15	10-16	1.50-1.60	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.43	1	3	.5-3
	15	---	---	---	---	---	---	-----------	----			
43---------------- Jocity	0-10	20-26	1.15-1.25	0.6-2.0	0.17-0.19	7.9-9.0	<2	Low--------	0.37	5	4L	<1
	10-17	15-18	1.20-1.40	2.0-6.0	0.11-0.13	7.9-9.0	<2	Low--------	0.24			
	17-29	30-35	1.25-1.40	0.2-0.6	0.15-0.17	7.9-9.0	<2	Moderate	0.37			
	29-35	10-15	1.25-1.40	2.0-6.0	0.10-0.12	7.9-9.0	<2	Low--------	0.32			
	35-60	23-28	1.25-1.40	0.2-0.6	0.15-0.18	7.9-9.0	<2	Moderate	0.37			
44*:												
Kilfoil Variant-	0-7	13-17	1.20-1.30	0.6-2.0	0.14-0.16	7.4-7.8	<2	Low--------	0.15	5	8	3-5
	7-29	20-35	1.25-1.35	0.2-0.6	0.17-0.18	6.6-7.8	<2	Moderate	0.32			
	29-46	20-35	1.25-1.35	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate	0.20			
	46-60	15-19	1.35-1.45	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low--------	0.20			
Hangdo-----------	0-11	15-20	1.25-1.35	0.6-2.0	0.15-0.17	7.4-7.8	<2	Low--------	0.32	3	6	3-5
	11-35	20-35	1.30-1.40	0.6-2.0	0.15-0.18	7.4-8.4	<2	Moderate	0.24			
	35-60	25-40	1.20-1.30	0.2-0.6	0.13-0.16	7.4-8.4	<2	Moderate	0.20			
Harpole Variant-	0-5	10-20	1.30-1.40	0.6-2.0	0.09-0.14	7.4-7.8	<2	Low--------	0.15	2	8	3-5
	5-28	25-35	1.40-1.50	0.6-2.0	0.08-0.12	7.4-8.4	<2	Moderate	0.10			
	28-60	15-30	1.25-1.35	0.6-2.0	0.04-0.06	7.4-8.4	<2	Moderate	0.05			
45, 46----------- Leighcan	0-8	10-18	1.20-1.30	0.6-2.0	0.09-0.14	6.1-6.5	<2	Low--------	0.15	5	8	1-3
	8-16	7-18	1.15-1.30	2.0-6.0	0.08-0.13	6.1-6.5	<2	Low--------	0.05			
	16-37	7-15	1.20-1.35	2.0-6.0	0.02-0.05	6.1-6.5	<2	Low--------	0.05			
	37-60	7-15	1.20-1.35	2.0-6.0	0.02-0.05	6.1-6.5	<2	Low--------	0.05			
47*:												
Lithic Torriorthents--	0-8	10-30	1.25-1.40	0.6-2.0	0.15-0.18	7.4-9.0	<2	Low--------	0.32	1	3	<.5
	8	---	---	---	---	---	---	-----------	----			
Badland.												
Rock outcrop.												

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
48*:												
Lithic Ustic Torriorthents--	0-2	5-17	1.30-1.50	2.0-6.0	0.12-0.15	7.9-8.4	<2	Low-------	0.32	1	3	.5-1
	2-14	5-15	1.20-1.55	2.0-6.0	0.08-0.10	7.9-8.4	<2	Low-------	0.28			
	14	---	---	---	---	---	---	----------	----			
Badland.												
Rock outcrop.												
49--------------- Meredith	0-7	15-23	1.30-1.40	2.0-6.0	0.10-0.14	5.6-6.0	<2	Low-------	0.15	2	8	3-5
	7-21	18-27	1.30-1.40	2.0-6.0	0.08-0.13	5.6-6.0	<2	Low-------	0.02			
	21-60	---	---	>20	0.02-0.04	4.5-5.5	<2	Low-------	0.02			
50, 51----------- Mido	0-27	2-10	1.40-1.50	6.0-20	0.08-0.10	7.9-9.0	<2	Low-------	0.37	5	2	<1
	27-60	3-8	1.40-1.50	6.0-20	0.05-0.09	7.9-9.0	<2	Low-------	0.32			
52--------------- Mivida	0-4	8-12	1.45-1.50	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low-------	0.37	3	3	1-2
	4-15	8-17	1.40-1.50	2.0-6.0	0.11-0.17	7.9-9.0	<2	Low-------	0.49			
	15-43	8-18	1.40-1.50	2.0-6.0	0.09-0.14	7.9-9.0	<2	Low-------	0.43			
	43	---	---	---	---	---	---	----------	----			
53--------------- Moab	0-3	12-16	1.20-1.30	2.0-6.0	0.08-0.09	7.4-8.4	<2	Low-------	0.20	5	8	.5-1
	3-10	14-18	1.20-1.30	2.0-6.0	0.08-0.09	7.9-9.0	<2	Low-------	0.20			
	10-60	10-18	1.30-1.45	2.0-6.0	0.06-0.08	7.9-9.0	<2	Low-------	0.17			
54--------------- Moab	0-2	12-16	1.20-1.30	2.0-6.0	0.08-0.09	7.4-8.4	<2	Low-------	0.17	5	8	.5-1
	2-10	14-18	1.20-1.30	2.0-6.0	0.08-0.09	7.9-9.0	<2	Low-------	0.20			
	10-60	10-18	1.30-1.45	2.0-6.0	0.06-0.08	7.9-9.0	<2	Low-------	0.17			
55*:												
Moab------------	0-3	12-16	1.20-1.30	2.0-6.0	0.08-0.09	7.4-8.4	<2	Low-------	0.20	5	8	.5-1
	3-10	14-18	1.20-1.30	2.0-6.0	0.08-0.09	7.9-9.0	<2	Low-------	0.20			
	10-60	10-18	1.30-1.45	2.0-6.0	0.06-0.08	7.9-9.0	<2	Low-------	0.17			
Rizno-----------	0-2	10-17	1.20-1.40	2.0-6.0	0.08-0.09	7.4-8.4	<2	Low-------	0.17	1	8	.5-1
	2-8	10-18	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
56--------------- Moenkopie	0-1	5-17	1.30-1.40	2.0-6.0	0.06-0.10	7.4-9.0	<2	Low-------	0.10	1	8	
	1-3	7-20	1.35-1.45	2.0-6.0	0.10-0.13	7.4-9.0	<2	Low-------	0.28			
	3	---	---	---	---	---	---	----------	----			
57*:												
Moenkopie-------	0-3	2-12	1.40-1.50	6.0-20.0	0.05-0.09	7.4-9.0	<2	Low-------	0.15	1	8	<1
	3-8	7-20	1.35-1.45	2.0-6.0	0.10-0.13	7.4-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
Rock outcrop.												
58--------------- Nakai	0-17	3-7	1.45-1.55	6.0-20	0.05-0.07	7.9-9.0	<2	Low-------	0.24	5	1	.5-1
	17-60	8-18	1.50-1.60	2.0-6.0	0.10-0.18	7.9-9.0	<2	Low-------	0.43			
59, 60----------- Namon	0-8	12-24	1.25-1.35	0.6-2.0	0.13-0.15	6.1-7.3	<2	Low-------	0.17	2	8	3-5
	8-14	12-24	1.25-1.35	0.6-2.0	0.15-0.17	6.1-7.3	<2	Low-------	0.28			
	14-25	12-22	1.30-1.45	0.6-2.0	0.10-0.13	6.1-7.3	<2	Low-------	0.20			
	25-60	10-27	1.40-1.50	0.6-6.0	0.06-0.08	6.1-7.3	<2	Low-------	0.15			
61--------------- Nepalto	0-5	10-12	1.35-1.45	6.0-20	0.07-0.08	7.9-8.4	<2	Low-------	0.17	1	8	.5-1
	5-60	2-8	1.35-1.50	6.0-20	0.03-0.05	7.9-9.0	<2	Low-------	0.10			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
62------------- Nepalto	0-3	10-12	1.35-1.45	6.0-20	0.07-0.08	7.9-8.4	<2	Low-------	0.15	1	8	.5-1
	3-60	2-8	1.35-1.50	6.0-20	0.03-0.05	7.9-9.0	<2	Low-------	0.10			
63------------- Newsrock	0-17	5-10	1.60-1.70	6.0-20	0.05-0.07	7.4-8.4	<2	Low-------	0.37	3	2	.5-1
	17-31	10-14	1.55-1.65	2.0-6.0	0.07-0.09	8.5-9.0	<2	Low-------	0.43			
	31-46	15-35	1.35-1.60	2.0-6.0	0.15-0.17	7.9-9.0	<2	Low-------	0.32			
	46-60	5-10	1.65-1.70	6.0-20	0.12-0.14	7.9-9.0	2-4	Low-------	0.37			
64, 65----------- Redbank	0-2	10-15	1.30-1.40	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low-------	0.37	5	3	1-3
	2-60	8-18	1.25-1.40	2.0-6.0	0.11-0.17	7.9-9.0	<2	Low-------	0.43			
66, 67----------- Redbank	0-4	10-15	1.30-1.40	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low-------	0.37	5	3	1-3
	4-60	8-18	1.25-1.40	2.0-6.0	0.11-0.17	7.9-9.0	<2	Low-------	0.43			
68------------- Redbank	0-4	7-16	1.20-1.30	2.0-6.0	0.15-0.17	8.5-9.0	<2	Low-------	0.49	5	3	.5-1
	4-60	5-15	1.25-1.40	2.0-6.0	0.06-0.12	>8.4	<2	Low-------	0.43			
69*: Richens---------	0-7	15-25	1.20-1.30	0.2-0.6	0.15-0.18	6.1-7.3	<2	Low-------	0.37	5	6	5-10
	7-19	15-30	1.25-1.35	0.06-0.2	0.13-0.16	6.6-7.8	<2	Moderate	0.20			
	19-38	40-50	1.40-1.50	<0.06	0.14-0.18	6.6-7.8	<2	Moderate	0.28			
	38-60	50-60	1.40-1.50	<0.06	0.12-0.15	6.6-7.8	<2	High------	0.15			
Herd------------	0-4	20-28	1.30-1.40	0.6-2.0	0.08-0.11	6.6-7.3	<2	Moderate	0.10	2	8	5-10
	4-21	30-38	1.40-1.50	0.2-0.6	0.12-0.16	6.6-7.3	<2	Moderate	0.17			
	21-60	41-55	1.40-1.50	<0.06	0.14-0.18	6.6-7.8	<2	High------	0.28			
70*: Rizno-----------	0-2	10-17	1.20-1.40	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-------	0.28	1	3	.5-3
	2-8	10-20	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
Rock outcrop.												
71*: Rizno-----------	0-2	10-17	1.20-1.40	2.0-6.0	0.08-0.09	7.4-8.4	<2	Low-------	0.17	1	8	.5-3
	2-8	10-20	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
Rock outcrop.												
72*. Rock outcrop												
73*: Rock outcrop.												
Moenkopie-------	0-3	2-12	1.40-1.50	6.0-20.0	0.05-0.09	7.4-9.0	<2	Low-------	0.15	1	8	<1
	3-8	7-20	1.35-1.45	2.0-6.0	0.10-0.13	7.4-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
74*: Rock outcrop.												
Rizno-----------	0-2	10-17	1.20-1.40	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low-------	0.28	1	3	.5-3
	2-8	10-18	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
75*: Rock outcrop.												
Rizno-----------	0-2	10-17	1.20-1.40	2.0-6.0	0.08-0.09	7.4-8.4	<2	Low-------	0.17	1	8	.5-3
	2-8	10-18	1.20-1.40	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low-------	0.28			
	8	---	---	---	---	---	---	----------	----			
76*: Rock outcrop.												
Ustic Torripsamments-	0-3	2-7	1.45-1.55	>6.0	0.06-0.09	6.6-8.4	<2	Low-------	0.24	3	1	<1
	3-34	2-7	1.45-1.55	>6.0	0.06-0.09	6.6-8.4	<2	Low-------	0.28			
	34	---	---	---	---	---	---	----------	----			
77*. Rubble land												
78--------------- Sedillo	0-7	14-24	1.35-1.50	0.6-2.0	0.06-0.10	7.4-8.4	<2	Low-------	0.20	2	8	1-3
	7-12	20-30	1.30-1.40	0.2-0.6	0.08-0.12	7.9-9.0	<2	Low-------	0.20			
	12-60	6-14	1.45-1.55	2.0-6.0	0.06-0.10	7.9-9.0	<2	Low-------	0.24			
79*:												
Shalako---------	0-2	8-18	1.30-1.45	6.0-20.0	0.07-0.10	7.4-9.0	<2	Low-------	0.15	1	8	1-3
	2-13	7-18	1.30-1.45	2.0-6.0	0.12-0.14	>7.8	<2	Low-------	0.20			
	13	---	---	---	---	---	---	----------	----			
Anasazi---------	0-9	12-17	1.20-1.30	2.0-6.0	0.08-0.13	7.4-8.4	<2	Low-------	0.24	2	8	1-3
	9-26	9-18	1.35-1.50	2.0-6.0	0.08-0.14	7.9-9.0	<2	Low-------	0.24			
	26	---	---	---	---	---	---	----------	----			
Rock outcrop.												
80--------------- Sheppard	0-3	2-5	1.50-1.60	6.0-20	0.05-0.07	7.4-8.4	<2	Low-------	0.20	5	1	<.5
	3-60	3-8	1.50-1.60	6.0-20	0.06-0.08	7.4-9.0	<2	Low-------	0.20			
81--------------- Sirref	0-3	15-25	1.20-1.30	0.6-2.0	0.14-0.17	6.6-7.8	<2	Low-------	0.28	1	6	3-5
	3-15	35-42	1.40-1.55	0.06-0.2	0.13-0.16	6.6-8.4	<2	Moderate	0.15			
	15-48	40-50	1.45-1.55	0.06-0.2	0.06-0.10	6.6-8.4	<2	Moderate	0.10			
	48-60	30-40	1.25-1.35	0.6-2.0	0.06-0.09	6.6-9.0	<2	Low-------	0.05			
82*:												
Sirref----------	0-3	15-25	1.20-1.30	0.6-2.0	0.14-0.17	6.6-7.8	<2	Low-------	0.28	1	6	3-5
	3-15	35-42	1.40-1.55	0.06-0.2	0.13-0.16	6.6-8.4	<2	Moderate	0.15			
	15-48	40-50	1.45-1.55	0.06-0.2	0.06-0.10	6.6-8.4	<2	Moderate	0.10			
	48-60	30-40	1.25-1.35	0.6-2.0	0.06-0.09	6.6-9.0	<2	Low-------	0.05			
Toone-----------	0-8	18-26	1.20-1.40	0.2-6.0	0.11-0.18	6.6-7.3	<2	Moderate	0.20	3	6	5-10
	8-25	18-27	1.20-1.40	0.2-6.0	0.11-0.12	6.6-7.3	<2	Moderate	0.10			
	25-33	35-40	1.25-1.35	0.2-0.6	0.13-0.16	6.6-7.3	<2	Moderate	0.15			
	33-60	40-50	1.35-1.45	0.06-0.2	0.08-0.12	6.6-7.3	<2	Moderate	0.10			
83--------------- Skylick	0-37	12-20	1.20-1.30	0.6-2.0	0.13-0.19	5.6-7.3	<2	Low-------	0.20	5	6	5-8
	37-60	25-35	1.35-1.45	0.6-2.0	0.12-0.16	5.6-7.3	<2	Moderate	0.10			
84*. Slickens												

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
85, 86: Strych	0-3	12-15	1.25-1.35	6.0-20.0	0.07-0.09	7.9-9.0	<2	Low	0.15	5	8	1-3
	3-10	14-18	1.25-1.35	2.0-6.0	0.08-0.11	7.9-9.0	<2	Low	0.20			
	10-25	12-16	1.25-1.35	6.0-20.0	0.07-0.09	>8.4	<2	Low	0.15			
	25-60	6-10	1.35-1.45	6.0-20.0	0.03-0.06	>8.4	<2	Low	0.10			
87: Strych	0-8	6-10	1.35-1.45	2.0-6.0	0.08-0.10	7.9-9.0	<2	Low	0.17	1	8	1-3
	8-27	14-27	1.30-1.45	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low	0.10			
	27-34	10-14	1.35-1.45	2.0-6.0	0.10-0.13	7.9-9.0	<2	Low	0.28			
	34-39	6-10	1.35-1.45	2.0-6.0	0.06-0.08	7.9-9.0	<2	Low	0.10			
	39-60	7-17	1.30-1.45	2.0-6.0	0.05-0.10	7.9-9.0	<2	Low	0.10			
88: Thoroughfare	0-2	6-18	1.25-1.35	2.0-6.0	0.10-0.12	7.9-9.0	<2	Low	0.28	5	3	.5-1
	2-60	8-20	1.40-1.65	2.0-6.0	0.06-0.18	7.9-9.0	<2	Low	0.28			
89: Thoroughfare	0-2	9-17	1.20-1.30	0.6-2.0	0.14-0.17	7.9-9.0	2-4	Low	0.37	5	5	.5-1
	2-60	2-29	1.45-1.65	0.6-6.0	0.09-0.16	7.9-9.0	2-4	Low	0.32			
90: Tolman Variant	0-10	15-22	1.25-1.35	0.6-2.0	0.14-0.17	6.1-7.3	<2	Low	0.28	1	6	3-5
	10-17	20-28	1.40-1.50	0.6-2.0	0.06-0.08	6.1-7.3	<2	Low	0.05			
	17	---	---	---	---	---	---	---	---			
91: Tomasaki	0-11	16-27	1.35-1.45	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.20	4	5	5-10
	11-34	35-45	1.40-1.55	0.06-0.2	0.16-0.18	6.6-7.8	<2	Moderate	0.20			
	34-50	27-40	1.45-1.55	0.2-0.6	0.12-0.16	6.6-7.8	<2	Moderate	0.15			
	50-60	27-40	1.45-1.55	0.2-0.6	0.12-0.16	6.6-7.8	<2	Moderate	0.15			
92: Tomasaki	0-6	16-27	1.35-1.45	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.20	4	5	5-10
	6-39	35-45	1.40-1.55	0.06-0.2	0.16-0.18	6.6-7.8	<2	Moderate	0.20			
	39-60	35-45	1.45-1.55	0.06-0.2	0.12-0.16	6.6-7.8	<2	Moderate	0.15			
93: Toone	0-22	16-23	1.25-1.35	0.6-2.0	0.14-0.17	6.1-7.3	<2	Low	0.20	3	5	5-10
	22-31	17-25	1.30-1.40	0.6-2.0	0.12-0.15	6.1-7.3	<2	Low	0.32			
	31-49	35-45	1.30-1.40	0.06-0.6	0.09-0.12	6.1-7.3	<2	Moderate	0.10			
	49-60	30-40	1.30-1.40	0.06-0.6	0.09-0.14	6.1-7.3	<2	Moderate	0.10			
94*:												
Toone	0-8	18-27	1.20-1.40	0.2-6.0	0.11-0.18	6.6-7.3	---	Low	0.20	3	6	5-10
	8-25	18-27	1.20-1.40	0.06-0.2	0.08-0.12	6.6-7.3	---	Low	0.20			
	25-33	35-40	1.25-1.35	0.2-0.6	0.13-0.16	6.6-7.3	---	Moderate	0.15			
	33-60	40-50	1.35-1.45	0.06-0.2	0.08-0.12	6.6-7.3	---	Moderate	0.10			
Sirref	0-9	15-25	1.20-1.30	2.0-6.0	0.08-0.11	6.6-7.8	<2	Low	0.10	1	8	3-5
	9-21	35-42	1.40-1.55	0.06-0.2	0.13-0.16	6.6-8.4	<2	Moderate	0.15			
	21-54	40-50	1.45-1.55	0.06-0.2	0.06-0.10	6.6-8.4	<2	Moderate	0.10			
	54-60	30-40	1.25-1.35	0.6-2.0	0.06-0.09	6.6-9.0	<2	Low	0.05			
Herm	0-8	27-35	1.30-1.40	0.2-0.6	0.16-0.18	6.1-7.8	<2	Moderate	0.24	5	6	3-5
	8-14	30-35	1.35-1.45	0.2-0.6	0.16-0.18	6.1-7.8	<2	Moderate	0.24			
	14-60	35-50	1.35-1.50	<0.2	0.16-0.18	7.4-8.4	<2	High	0.28			
95: Trail	0-3	1-3	1.45-1.55	6.0-20	0.06-0.08	7.4-9.0	<4	Low	0.20	5	1	.5-1
	3-60	3-15	1.40-1.50	6.0-20	0.05-0.12	7.4-9.0	<4	Low	0.24			
96: Tukuhnik	0-7	20-27	1.20-1.30	0.2-0.6	0.14-0.17	6.6-7.8	<2	Moderate	0.20	4	6	3-5
	7-13	27-35	1.25-1.35	0.2-0.6	0.16-0.18	6.6-7.8	<2	Moderate	0.32			
	13-41	35-40	1.20-1.30	0.06-0.2	0.16-0.18	7.4-8.4	<2	High	0.24			
	41-51	35-50	1.25-1.35	0.06-0.2	0.16-0.18	7.9-9.0	<2	High	0.24			
	51	---	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
97*:												
Ustic Torrifluvents--	0-13	2-10	1.35-1.45	6.0-20	0.09-0.11	7.9-8.4	<2	Low--------	0.43	5	2	1-3
	13-60	12-23	1.05-1.55	2.0-6.0	0.10-0.13	7.9-9.0	>4	Low--------	0.24			
Ustic Torrifluvents, sodic---------	0-3	2-10	1.35-1.45	6.0-20	0.09-0.11	7.9-8.4	<2	Low--------	0.43	5	2	1-3
	3-60	12-23	1.05-1.55	2.0-6.0	0.10-0.13	7.9-9.0	>4	Low--------	0.24			
	60-65	2-12	1.40-1.45	6.0-20	0.03-0.07	7.9-8.4	<2	Low--------	0.20			
Typic Ustifluvents---	0-1	18-22	1.25-1.35	0.6-2.0	0.15-0.17	7.4-7.8	4-8	Low--------	0.37	5	4L	1-3
	1-60	5-18	1.45-1.60	2.0-6.0	0.07-0.09	7.4-9.0	>4	Low--------	0.17			
98--------------- Ustic Torriorthents	0-11	10-15	1.20-1.40	0.6-6.0	0.07-0.10	7.9-9.0	<4	Low--------	0.10	1	8	1-2
	11-30	20-30	1.25-1.35	0.6-2.0	0.10-0.12	7.9-9.0	<4	Low--------	0.05			
	30-45	20-30	1.25-1.35	0.6-2.0	0.13-0.15	7.9-9.0	<4	Moderate	0.15			
	45	---	---	---	---	---	---	-----------	----			
99*:												
Ustic Torriorthents--	0-7	5-15	1.35-1.55	2.0-20	0.03-0.06	7.9-9.0	<4	Low--------	0.15	1	8	1-3
	7-60	10-18	1.35-1.45	2.0-6.0	0.05-0.07	7.9-9.0	<4	Low--------	0.10			
Lithic Torriorthents--	0-17	5-20	1.35-1.55	2.0-20	0.08-0.12	7.4-9.0	<2	Low--------	0.24	1	3	<.5
	17	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
100*:												
Ustic Torriorthents--	0-3	5-15	1.35-1.55	2.0-20	0.03-0.06	7.9-9.0	<4	Low--------	0.15	1	8	1-3
	3-11	15-25	1.25-1.45	0.6-2.0	0.10-0.12	7.9-9.0	<4	Low--------	0.15			
	11-30	20-30	1.25-1.35	0.6-2.0	0.10-0.12	7.9-9.0	<4	Low--------	0.05			
	30-45	20-30	1.25-1.35	0.6-2.0	0.13-0.15	7.9-9.0	<4	Low--------	0.10			
	45	---	---	---	---	---	---	-----------	----			
Ustollic Calciorthids---	0-1	10-20	1.25-1.35	2.0-6.0	0.08-0.11	7.4-8.4	<4	Low--------	0.20	3	8	1-3
	1-8	10-24	1.25-1.35	0.6-2.0	0.11-0.15	7.9-9.0	<4	Low--------	0.32			
	8-32	15-26	1.25-1.35	0.6-2.0	0.12-0.14	7.9-9.0	<4	Low--------	0.20			
	32-40	30-40	1.30-1.40	0.2-0.6	0.15-0.18	7.9-9.0	<4	Moderate	0.32			
	40	---	---	---	---	---	---	-----------	----			
101*:												
Ustic Torriorthents--	0-3	5-15	1.35-1.55	2.0-20	0.03-0.06	7.9-9.0	<4	Low--------	0.15	1	8	1-3
	3-11	15-25	1.25-1.45	0.6-2.0	0.10-0.12	7.9-9.0	<4	Low--------	0.15			
	11-30	20-30	1.25-1.35	0.6-2.0	0.10-0.12	7.9-9.0	<4	Low--------	0.05			
	30-45	20-30	1.25-1.35	0.6-2.0	0.13-0.15	7.9-9.0	<4	Low--------	0.10			
	45	---	---	---	---	---	---	-----------	----			
Ustollic Haplargids-----	0-8	8-18	1.30-1.45	2.0-6.0	0.08-0.10	7.4-8.4	<2	Low--------	0.17	3	8	1-3
	8-24	20-40	1.15-1.35	0.2-2.0	0.13-0.16	7.4-8.4	<2	Moderate	0.10			
	24-60	28-35	1.10-1.30	0.06-2.0	0.12-0.15	7.4-9.0	<2	Moderate	0.20			
102-------------- Waas	0-10	12-18	1.45-1.50	2.0-6.0	0.15-0.17	6.6-7.8	<2	Low--------	0.37	5	3	3-5
	10-60	18-35	1.30-1.45	0.2-0.6	0.17-0.18	6.6-8.4	<2	Moderate	0.43			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
103----------------- Windwhistle	0-2	8-13	1.40-1.50	2.0-6.0	0.14-0.16	7.4-8.4	<2	Low--------	0.49	3	3	1-3
	2-25	13-18	1.40-1.55	2.0-6.0	0.12-0.16	7.9-9.0	<2	Low--------	0.43			
	25-38	---	---	---	---	---	---	------------	-----			
	38	---	---	---	---	---	---	------------	-----			
104*:												
Windwhistle------	0-2	8-13	1.40-1.50	2.0-6.0	0.14-0.16	7.4-8.4	<2	Low--------	0.49	3	3	1-3
	2-25	13-18	1.40-1.55	2.0-6.0	0.12-0.16	7.9-9.0	<2	Low--------	0.43			
	25-38	---	---	---	---	---	---	------------	-----			
	38	---	---	---	---	---	---	------------	-----			
Sazi--------------	0-3	10-16	1.35-1.50	2.0-6.0	0.13-0.17	7.4-8.4	<2	Low--------	0.43	3	3	1-3
	3-21	10-18	1.35-1.50	2.0-6.0	0.10-0.16	7.4-9.0	<2	Low--------	0.43			
	21-31	8-16	1.35-1.50	2.0-6.0	0.11-0.16	>7.8	<2	Low--------	0.37			
	31	---	---	---	---	---	---	------------	-----			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "occasional," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Thick-ness	Uncoated steel	Concrete
					Ft			In		In			
1*:													
Arches-----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Moderate.
Sheppard---------	A	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Rock outcrop.													
2*. Badland													
3---------------- Barnum	B	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	---	---	High-----	Moderate.
4---------------- Barnum	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
5---------------- Barnum	B	Occasional	Very brief	Jun-Oct	>6.0	---	---	>60	---	---	---	High-----	Moderate.
6---------------- Barx	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
7, 8------------- Begay	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
9*:													
Begay------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Rizno------------	D	None--------	---	---	>6.0	---	---	4-20	Hard	---	---	High-----	Moderate.
10*:													
Begay------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Rock outcrop.													
Mido-------------	A	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
11--------------- Bluechief	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Moderate.
12*:													
Bluechief--------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Thick-ness	Uncoated steel	Concrete
					Ft			In		In			
12*:													
Hanksville-------	D	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	High.
Leeko------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
13---------------- Bluehon	C	None--------	---	---	>6.0	---	---	>60	---	20-40	Thin	High-----	Moderate.
14*:													
Bond-------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Rizno------------	D	None--------	---	---	>6.0	---	---	4-20	Hard	---	---	High-----	Moderate.
15*:													
Bond-------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Windwhistle------	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Moderate.
16*:													
Bookcliff Variant	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
Beje-------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Moderate.
17, 18----------- Broad Canyon	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
19---------------- Cahona	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
20---------------- Cataract	B	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Moderate.
21*:													
Dranyon----------	B	None--------	---	---	>6.0	---	---	40-60	Hard	---	---	Moderate	Moderate.
Tolman Variant---	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
22*:													
Dumps.													
Pits.													
23---------------- Factory	B	None--------	---	---	>6.0	---	---	>60	---	20-30	Thick	High-----	Moderate.
24, 25----------- Falcon	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
					Ft			In		In			
26*, 27*:													
Falcon------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Bond--------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Rock outcrop.													
28, 29------------ Flygare	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
30---------------- Frolic	C	Occasional	Long------	Apr-Jun	3.0-5.0	Apparent	Mar-Jul	>60	---	---	---	High-----	Moderate.
31---------------- Fughes	C	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
32*. Gullied land													
33---------------- Hagerman	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
34, 35------------ Hangdo	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
36---------------- Harpole	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
37---------------- Herm	C	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
38*:													
Herm--------------	C	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Iles--------------	C	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
39*:													
Herm--------------	C	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Tomasaki----------	C	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
Falcon------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
40---------------- Hoskinnini	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Moderate.
41*, 42*:													
Ignacio-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
					Ft			In		In			
41*, 42*:													
Leanto------------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Moderate.
43----------------- Jocity	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Low.
44*:													
Kilfoil Variant--	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Hangdo-----------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Harpole Variant--	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
45, 46----------- Leighcan	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
47*:													
Lithic Torriorthents---	D	None--------	---	---	>6.0	---	---	4-20	Hard	---	---	High-----	Moderate.
Badland.													
Rock outcrop.													
48*:													
Lithic Ustic Torriorthents---	D	None--------	---	---	>6.0	---	---	2-20	Hard	---	---	High-----	Moderate.
Badland.													
Rock outcrop.													
49----------------- Meredith	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	High.
50, 51----------- Mido	A	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
52----------------- Mivida	B	None--------	---	---	>6.0	---	---	40-60	Soft	---	---	High-----	Moderate.
53, 54----------- Moab	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
55*:													
Moab-------------	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Rizno------------	D	None--------	---	---	>6.0	---	---	4-20	Hard	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Thickness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In		In			
56----------------- Moenkopie	D	None---------	---	---	>6.0	---	---	3-20	Hard	---	---	High------	High.
57*:													
Moenkopie---------	D	None---------	---	---	>6.0	---	---	3-20	Hard	---	---	High------	High.
Rock outcrop.													
58----------------- Nakai	B	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
59, 60------------- Namon	B	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
61, 62------------- Nepalto	A	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
63----------------- Newsrock	B	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
64, 65, 66, 67---- Redbank	B	Rare---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
68----------------- Redbank	B	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	---	---	High------	Moderate.
69*:													
Richens-----------	C	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
Herd--------------	C	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
70*, 71*:													
Rizno-------------	D	None---------	---	---	>6.0	---	---	4-20	Hard	---	---	High------	Moderate.
Rock outcrop.													
72*. Rock outcrop													
73*:													
Rock outcrop.													
Moenkopie---------	D	None---------	---	---	>6.0	---	---	3-20	Hard	---	---	High------	High.
74*, 75*:													
Rock outcrop.													
Rizno-------------	D	None---------	---	---	>6.0	---	---	4-20	Hard	---	---	High------	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Thick-ness	Uncoated steel	Concrete
					Ft			In		In			
76*:													
Rock outcrop.													
Ustic Torripsamments--	C	None--------	---	---	>6.0	---	---	20-60	Hard	---	---	High-----	Moderate.
77*. Rubble land													
78----------------- Sedillo	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
79*:													
Shalako----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	High-----	Moderate.
Anasazi----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Moderate.
Rock outcrop.													
80---------------- Sheppard	A	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
81---------------- Sirref	D	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
82*:													
Sirref-----------	D	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
Toone------------	C	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
83---------------- Skylick	B	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
84*. Slickens													
85, 86, 87-------- Strych	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
88, 89------------ Thoroughfare	B	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	---	---	High-----	Moderate.
90---------------- Tolman Variant	D	None--------	---	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
91, 92------------ Tomasaki	C	None--------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Depth	Thick-ness	Uncoated steel	Concrete
					Ft			In		In			
93----------------- Toone	C	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
94*:													
Toone-------------	C	None---------	---	---	>6.0	---	---	>60	---	---	---	Moderate	Low.
Sirref------------	D	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
Herm--------------	C	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
95----------------- Trail	A	None---------	---	---	>6.0	---	---	>60	---	---	---	High------	Moderate.
96----------------- Tukuhnik	C	None---------	---	---	>6.0	---	---	40-60	Soft	---	---	High------	Moderate.
97*:													
Ustic Torrifluvents---	B	Occasional	Brief-----	Apr-Sep	>6.0	---	---	>60	---	---	---	High------	High.
Ustic Torrifluvents, sodic-----------	B	Occasional	Brief-----	Apr-Sep	>6.0	---	---	>60	---	---	---	High------	High.
Typic Ustifluvents----	B	Frequent----	Brief-----	May-Jun	4.0-6.0	Apparent	May-Jun	>60	---	---	---	High------	High.
98----------------- Ustic Torriorthents	C	None---------	---	---	>6.0	---	---	>20	Soft	---	---	High------	Moderate.
99*:													
Ustic Torriorthents---	C	None---------	---	---	>6.0	---	---	>20	Soft	---	---	High------	Moderate.
Lithic Torriorthents---	D	None---------	---	---	>6.0	---	---	4-20	Hard	---	---	High------	Moderate.
Rock outcrop.													
100*:													
Ustic Torriorthents---	C	None---------	---	---	>6.0	---	---	>20	Soft	---	---	High------	Moderate.
Ustollic Calciorthids----	C	None---------	---	---	>6.0	---	---	>20	Soft	---	---	High------	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
					Ft			In		In			
101*:													
Ustic Torriorthents---	C	None--------	---	---	>6.0	---	---	>20	Soft	---	---	High-----	Moderate.
Ustollic Haplargids------	B	None--------	---	---	>6.0	---	---	>20	Soft	---	---	High-----	Moderate.
102---------------- Waas	B	None--------	---	---	>6.0	---	---	>60	---	---	---	High-----	Moderate.
103---------------- Windwhistle	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Moderate.
104*:													
Windwhistle------	C	None--------	---	---	>6.0	---	---	20-40	Soft	---	---	High-----	Moderate.
Sazi-------------	C	None--------	---	---	>6.0	---	---	20-40	Hard	---	---	High-----	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Anasazi	Coarse-loamy, mixed, mesic Ustollic Calciorthids
Arches	Mixed, mesic Lithic Torripsamments
Barnum	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Barx	Fine-loamy, mixed, mesic Ustollic Haplargids
Begay	Coarse-loamy, mixed, mesic Ustollic Camborthids
Beje	Loamy, mixed Lithic Argiborolls
Bluechief	Coarse-loamy, mixed, mesic Typic Calciorthids
Bluehon	Loamy-skeletal, carbonatic, mesic Petrocalcic Calciustolls
Bond	Loamy, mixed, mesic Lithic Ustollic Haplargids
Bookcliff Variant	Fine-loamy, mixed Typic Argiborolls
Broad Canyon	Loamy-skeletal, mixed Typic Cryoborolls
Cahona	Fine-silty, mixed, mesic Ustollic Haplargids
Cataract	Fine-loamy, mixed, mesic Typic Haplargids
Dranyon	Fine-loamy, mixed Argic Pachic Cryoborolls
Factory	Coarse-loamy, carbonatic, mesic Ustollic Paleorthids
Falcon	Loamy, mixed Lithic Haploborolls
Flygare	Loamy-skeletal, mixed Cryic Pachic Paleborolls
Frolic	Fine-loamy, mixed Cumulic Haploborolls
Fughes	Fine, montmorillonitic Pachic Argiborolls
Hagerman	Fine-loamy, mixed, mesic Ustollic Haplargids
Hangdo	Fine-loamy, mixed Typic Argiborolls
Hanksville	Fine, mixed (calcareous), mesic Typic Torriorthents
Harpol Variant	Loamy-skeletal, mixed Mollic Eutroboralfs
Harpole	Loamy-skeletal, mixed Typic Argiborolls
Herd	Fine, montmorillonitic Mollic Cryoboralfs
Herm	Fine, montmorillonitic Typic Argiborolls
Hoskinnini	Loamy, mixed, mesic Lithic Haplargids
Ignacio	Coarse-loamy, mixed, mesic Ustollic Camborthids
Iles	Fine, montmorillonitic Mollic Eutroboralfs
Jocity	Fine-loamy, mixed (calcareous), mesic Typic Torrifluvents
Kilfoil Variant	Fine-loamy, mixed Mollic Eutroboralfs
Leanto	Loamy, mixed, mesic Lithic Camborthids
Leeko	Fine-loamy, mixed, mesic Typic Natrargids
Leighcan	Loamy-skeletal, mixed Dystric Cryochrepts
Lithic Torriorthents	Lithic Torriorthents
Lithic Ustic Torriorthents	Lithic Ustic Torriorthents
Meredith	Loamy-skeletal over fragmental, mixed Pergelic Cryumbrepts
Mido	Mixed, mesic Ustic Torripsamments
Mivida	Coarse-loamy, mixed, mesic Ustollic Calciorthids
Moab	Loamy-skeletal, carbonatic, mesic Ustollic Calciorthids
Moenkopie	Loamy, mixed (calcareous), mesic Lithic Torriorthents
Nakai	Coarse-loamy, mixed, mesic Typic Calciorthids
Namon	Loamy-skeletal, mixed Typic Cryoboralfs
Nepalto	Sandy-skeletal, mixed, mesic Typic Torriorthents
Newsrock	Sandy, mixed, mesic Ustollic Haplargids
Redbank	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Richens	Fine, montmorillonitic Argic Pachic Cryoborolls
Rizno	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Sazi	Coarse-loamy, mixed, mesic Ustollic Calciorthids
Sedillo	Loamy-skeletal, mixed, mesic Ustollic Haplargids
Shalako	Loamy, mixed, mesic Lithic Ustollic Calciorthids
Sheppard	Mixed, mesic Typic Torripsamments
Sirref	Clayey-skeletal, montmorillonitic Aridic Argiborolls
Skylick	Fine-loamy, mixed Cryic Pachic Paleborolls
Strych	Loamy-skeletal, mixed, mesic Ustollic Calciorthids
Thoroughfare	Coarse-loamy, mixed (calcareous), mesic Typic Torrifluvents
Tolman Variant	Loamy-skeletal, mixed Lithic Argiborolls
Tomasaki	Fine, montmorillonitic Typic Argiborolls
Toone	Clayey-skeletal, montmorillonitic Cryic Pachic Paleborolls
Trail	Sandy, mixed, mesic Typic Torrifluvents
Tukuhnik	Fine, montmorillonitic Typic Argiborolls
Typic Ustifluvents	Typic Ustifluvents
Ustic Torrifluvents	Ustic Torrifluvents
Ustic Torriorthents	Ustollic Torriorthents
Ustic Torriorthents	Ustic Torriorthents

TABLE 14.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Ustic Torripsamments	Ustic Torripsamments
Ustollic Calciorthids	Ustollic Calciorthids
Ustollic Haplargids	Ustollic Haplargids
Waas	Fine-silty, mixed Aridic Argiborolls
Windwhistle	Coarse-loamy, mixed, mesic Ustollic Haplargids

U.S. Government Printing Office: 1991-281-364/40001

SOIL LEGEND

DOMINANTLY WELL DRAINED AND SOMEWHAT EXCESSIVELY DRAINED, NEARLY LEVEL TO MODERATELY STEEP SOILS ON LOW BENCHES, TERRACES, CUESTAS, AND VALLEYS IN AN ARID CLIMATIC ZONE

1 ROCK OUTCROP-MOENKOPIE: Rock outcrop, and shallow, well drained, gently sloping to strongly sloping soils that formed in residuum derived from sandstone; on low benches and cuestas

2 MOENKOPIE-ROCK OUTCROP-HOSKINNINI: Shallow, well drained, nearly level to moderately steep soils that formed in residuum derived from sandstone and limestone, and Rock outcrop; on low benches and cuestas

3 THOROUGHFARE-SHEPPARD-NAKAI: Very deep, well drained and somewhat excessively drained, nearly level and gently sloping soils that formed in alluvium and eolian deposits derived from sandstone and shale; on valley floors and low benches

DOMINANTLY WELL DRAINED, GENTLY SLOPING TO EXTREMELY STEEP SOILS ON BENCHES, CUESTAS, MESAS, ESCARPMENTS, AND CANYON WALLS IN A SEMIARID CLIMATIC ZONE

4 USTIC TORRIORTHENTS-LITHIC TORRIORTHENTS-ROCK OUTCROP: Shallow to very deep, strongly sloping to extremely steep soils that formed in colluvium and residuum derived from sedimentary rock, and Rock outcrop; on escarpments and canyon walls

5 ROCK OUTCROP-RIZNO, DRY-MIDO: Rock outcrop, and shallow and very deep, gently sloping to steep soils that formed in residuum and eolian deposits derived from sandstone and shale; on escarpments, mesas, benches, and cuestas

DOMINANTLY WELL DRAINED, GENTLY SLOPING TO MODERATELY STEEP SOILS ON BENCHES, CUESTAS, FANS, MESAS, ALLUVIAL BOTTOMS, STREAM TERRACES, AND VALLEY FLOORS IN A SEMIARID CLIMATIC ZONE

6 BEGAY-MOAB-REDBANK: Very deep, gently sloping to moderately steep soils that formed in alluvium and eolian deposits derived from sandstone and diorite; on benches, cuestas, alluvial fans, alluvial bottoms, stream terraces, and valley floors

7 RIZNO, DRY-ROCK OUTCROP: Shallow, gently sloping to strongly sloping soils that formed in eolian deposits and residuum derived dominantly from sandstone, shale, and Rock outcrop; on benches, cuestas, and mesas

DOMINANTLY WELL DRAINED, GENTLY SLOPING TO VERY STEEP SOILS ON UPLAND BENCHES, LANDSLIDES, CUESTAS, HILLSIDES, AND ESCARPMENTS IN A DRY, SUBHUMID CLIMATIC ZONE

8 CAHONA-BEGAY-HAGERMAN: Moderately deep and very deep, gently sloping soils that formed in eolian deposits derived from sandstone; on upland benches and cuestas

9 RIZNO-ROCK OUTCROP: Shallow, gently sloping to moderately steep soils that formed in residuum and eolian deposits derived from sandstone and shale, and Rock outcrop; on upland benches and cuestas

10 USTIC TORRIORTHENTS-USTOLLIC CALCIORTHIDS-USTOLLIC HAPLARGIDS: Moderately deep to very deep, strongly sloping to very steep soils that formed in residuum and colluvium derived from shale and sandstone; on hillsides, landslides, and escarpments

DOMINANTLY WELL DRAINED, GENTLY SLOPING TO VERY STEEP SOILS ON HIGH BENCHES, CUESTAS, FANS, LANDSLIDES, AND ESCARPMENTS IN MOIST SUBHUMID AND HUMID CLIMATIC ZONES

11 HERM-FALCON-WAAS: Shallow and very deep, gently sloping to moderately steep soils that formed in alluvium, residuum, colluvium, and eolian deposits derived from igneous and sedimentary rock; on high benches, cuestas, fans, and landslides

12 FALCON-HERM-TOONE: Shallow and very deep, moderately steep to very steep soils that formed in residuum, colluvium, and alluvium derived from sedimentary rock and diorite, and Rock outcrop; on landslides and escarpments

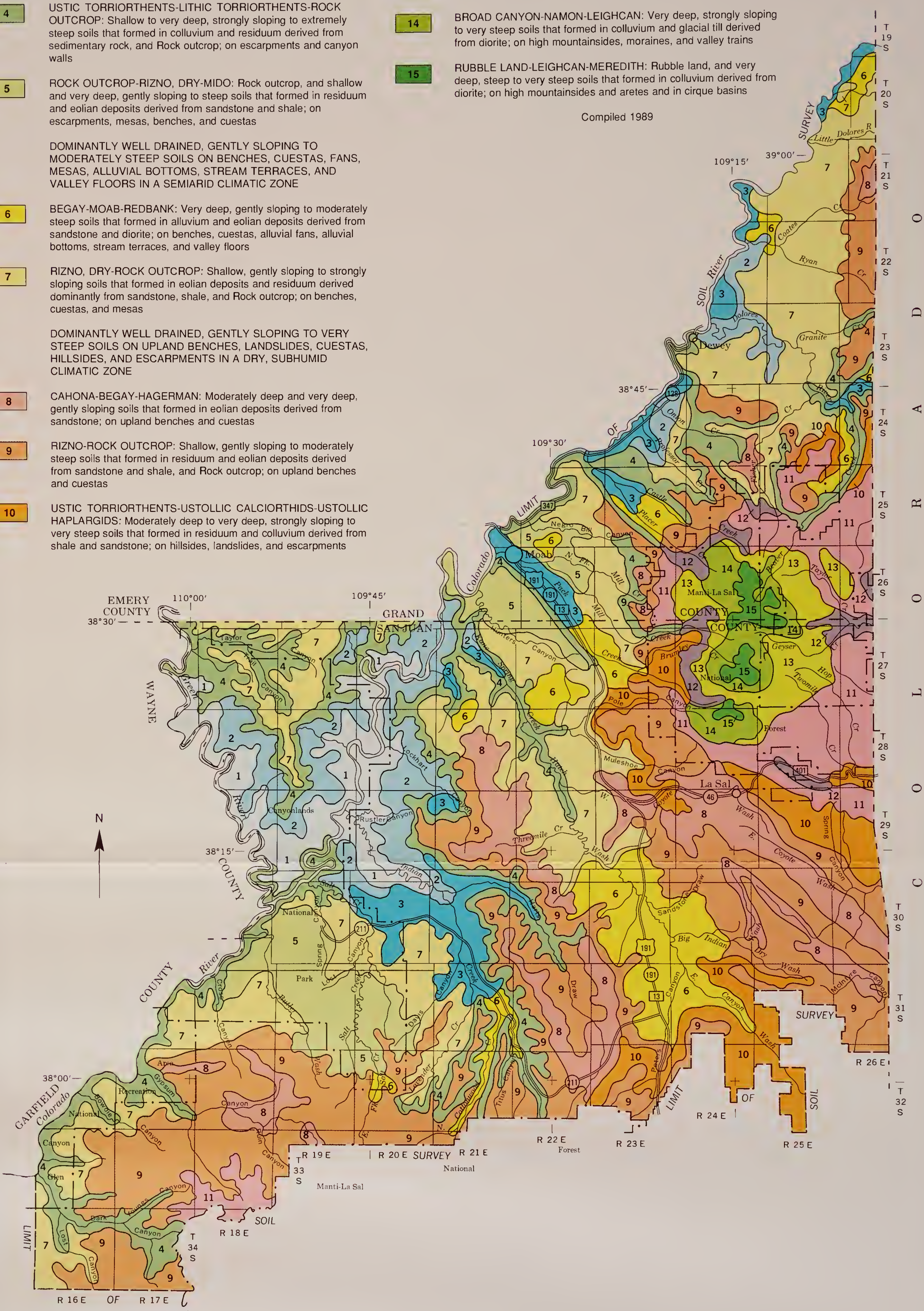
DOMINANTLY WELL DRAINED, GENTLY SLOPING TO VERY STEEP SOILS ON HIGH MOUNTAINSIDES, FANS, MORAINES, LANDSLIDES, VALLEY TRAINS, ARETES, AND CIRQUE BASINS IN A HUMID CLIMATIC ZONE

13 FLYGARE-SKYLICK-TOONE: Very deep, gently sloping to steep soils that formed in colluvium, glacial till, and alluvium derived from diorite, shale, and sandstone; on high mountainsides, fans, and landslides

14 BROAD CANYON-NAMON-LEIGHCAN: Very deep, strongly sloping to very steep soils that formed in colluvium and glacial till derived from diorite; on high mountainsides, moraines, and valley trains

15 RUBBLE LAND-LEIGHCAN-MEREDITH: Rubble land, and very deep, steep to very steep soils that formed in colluvium derived from diorite; on high mountainsides and aretes and in cirque basins

Compiled 1989



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
UTAH AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

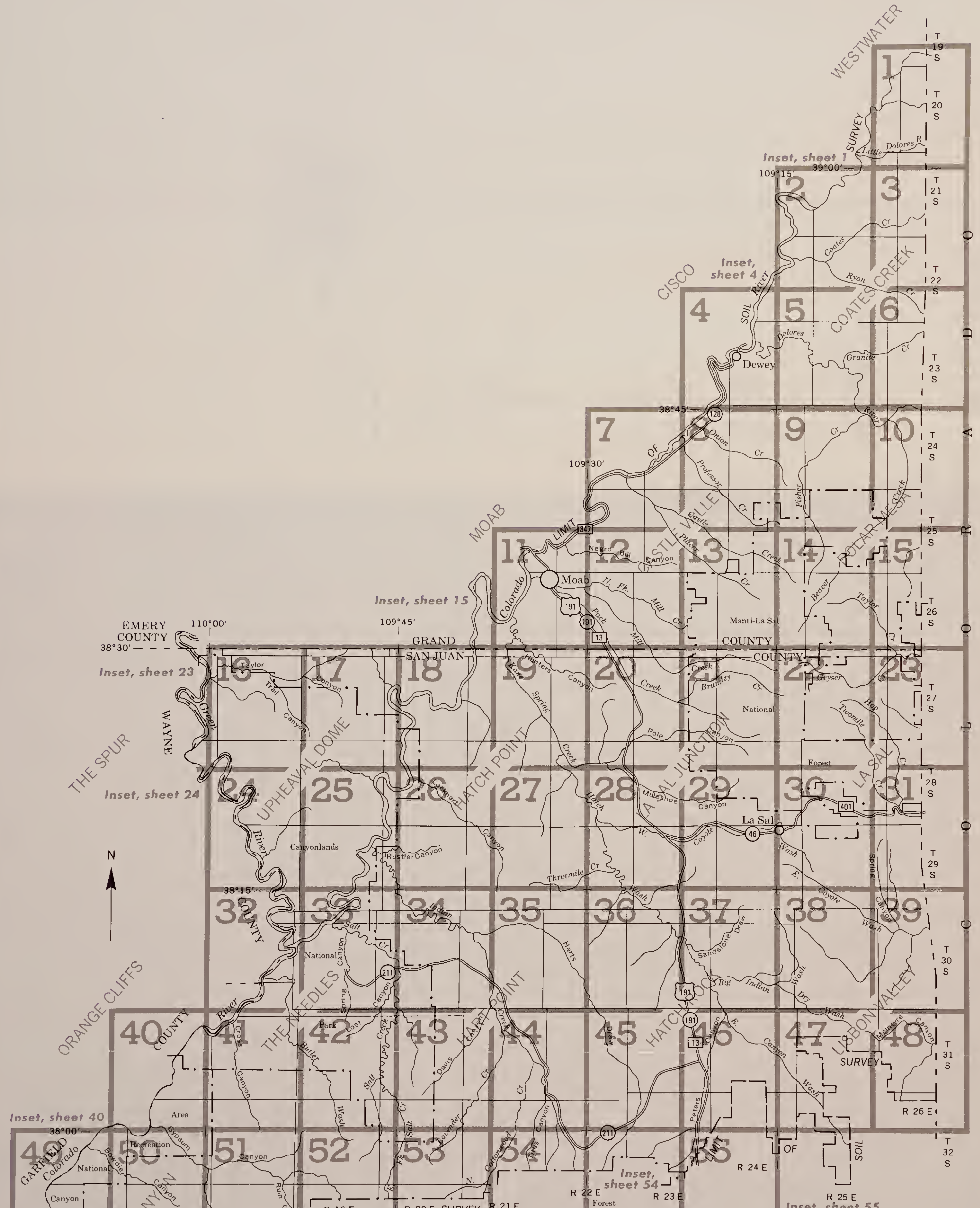
CANYONLANDS AREA, UTAH
PARTS OF GRAND AND SAN JUAN COUNTIES

Scale 1:443,520

1 0 1 2 3 4 5 6 7 Miles

0 7 14 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SECTIONALIZED TOWNSHIP					
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

CANYONLANDS AREA, UTAH
PARTS OF GRAND AND SAN JUAN COUNTIES

Scale 1:443,520

1 0 1 2 3 4 5 6 7 Miles

0 7 14 Km

SOIL LEGEND

SYMBOL	NAME
1	Arches-Sheppard-Rock outcrop complex, 2 to 8 percent slopes
2	Badland
3	Barnum loam, 0 to 3 percent slopes
4	Barnum loam, 3 to 8 percent slopes
5	Barnum silty clay loam, 0 to 3 percent slopes
6	Barx fine sandy loam, 3 to 8 percent slopes
7	Begay fine sandy loam, 2 to 6 percent slopes
8	Begay fine sandy loam, moist, 2 to 6 percent slopes
9	Begay-Rizno complex, 3 to 15 percent slopes
10	Begay-Rock outcrop-Mido complex, 2 to 35 percent slopes
11	Bluechief fine sandy loam, 1 to 8 percent slopes
12	Bluechief-Hanksville-Leeko complex, 1 to 15 percent slopes
13	Bluehon stony loam, 2 to 15 percent slopes
14	Bond-Rizno fine sandy loams, 3 to 15 percent slopes
15	Bond-Windwhistle complex, 2 to 15 percent slopes
16	Bookcliff Variant-Beje complex, 2 to 15 percent slopes
17	Broad Canyon very cobbly loam, 50 to 70 percent slopes
18	Broad Canyon very stony loam, 50 to 70 percent slopes
19	Cahona fine sandy loam, 2 to 8 percent slopes
20	Cataract loamy fine sand, 2 to 8 percent slopes
21	Dranyon-Tolman Variant complex, 8 to 20 percent slopes
22	Dumps-Pits complex
23	Factory gravelly fine sandy loam, 2 to 6 percent slopes
24	Falcon fine sandy loam, 8 to 15 percent slopes
25	Falcon gravelly sandy loam, 25 to 65 percent slopes
26	Falcon-Bond-Rock outcrop complex, 2 to 15 percent slopes
27	Falcon-Bond-Rock outcrop complex, 15 to 70 percent slopes
28	Flygare loam, 5 to 25 percent slopes
29	Flygare loam, 25 to 50 percent slopes
30	Frolic loam, 2 to 6 percent slopes
31	Fughes loam, 4 to 10 percent slopes
32	Gullied land
33	Hagerman very fine sandy loam, 2 to 8 percent slopes
34	Hangdo loam, 3 to 15 percent slopes
35	Hangdo cobbly loam, 3 to 25 percent slopes
36	Harpole very cobbly loam, 25 to 60 percent slopes
37	Herm clay loam, 8 to 20 percent slopes
38	Herm-Iles stony loams, 3 to 25 percent slopes
39	Herm-Tomasaki-Falcon complex, 25 to 65 percent slopes
40	Hoskinnini very gravelly fine sandy loam, 0 to 8 percent slopes
41	Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes
42	Ignacio-Leanto fine sandy loams, dry, 2 to 6 percent slopes
43	Jocity loam, 2 to 4 percent slopes
44	Kilfoil Variant-Hangdo-Harpole Variant complex, 3 to 25 percent slopes
45	Leighcan cobbly loam, 25 to 50 percent slopes
46	Leighcan cobbly loam, 50 to 70 percent slopes
47	Lithic Torriorthents-Badland-Rock outcrop complex, 15 to 30 percent slopes
48	Lithic Ustic Torriorthents-Badland-Rock outcrop complex, 15 to 30 percent slopes
49	Meredith stony loam, 20 to 70 percent slopes
50	Mido loamy fine sand, 2 to 8 percent slopes
51	Mido loamy fine sand, dry, 2 to 8 percent slopes
52	Mivida fine sandy loam, 2 to 8 percent slopes
53	Moab gravelly fine sandy loam, 2 to 8 percent slopes

SYMBOL	NAME
54	Moab very cobbly fine sandy loam, 3 to 30 percent slopes
55	Moab-Rizno gravelly fine sandy loams, 2 to 15 percent slopes
56	Moenkopie very gravelly sandy loam, 3 to 30 percent slopes
57	Moenkopie-Rock outcrop complex, 1 to 15 percent slopes
58	Nakai fine sand, 2 to 8 percent slopes
59	Namon gravelly loam, 8 to 30 percent slopes
60	Namon gravelly loam, 30 to 50 percent slopes
61	Nepalto gravelly sandy loam, 2 to 8 percent slopes
62	Nepalto very stony sandy loam, 2 to 8 percent slopes
63	Newsrock loamy fine sand, 1 to 3 percent slopes
64	Redbank fine sandy loam, 0 to 3 percent slopes
65	Redbank fine sandy loam, 3 to 8 percent slopes
66	Redbank fine sandy loam, dry, 0 to 3 percent slopes
67	Redbank fine sandy loam, dry, 3 to 8 percent slopes
68	Redbank very fine sandy loam, 0 to 3 percent slopes
69	Richens-Herd complex, 3 to 15 percent slopes
70	Rizno-Rock outcrop complex, 3 to 15 percent slopes
71	Rizno, dry-Rock outcrop complex, 3 to 15 percent slopes
72	Rock outcrop
73	Rock outcrop-Moenkopie complex, 3 to 15 percent slopes
74	Rock outcrop-Rizno complex, 3 to 15 percent slopes
75	Rock outcrop-Rizno, dry complex, 3 to 15 percent slopes
76	Rock outcrop-Ustic Torripsamments complex, 2 to 15 percent slopes
77	Rubble land
78	Sedillo very stony fine sandy loam, 3 to 15 percent slopes
79	Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes
80	Sheppard fine sand, 2 to 8 percent slopes
81	Sirref loam, 4 to 8 percent slopes
82	Sirref-Toone loams, 4 to 10 percent slopes
83	Skylick loam, 5 to 30 percent slopes
84	Slickens
85	Strych very cobbly fine sandy loam, 8 to 30 percent slopes
86	Strych very cobbly fine sandy loam, 30 to 60 percent slopes
87	Strych very cobbly fine sandy loam, dry, 8 to 15 percent slopes
88	Thoroughfare fine sandy loam, 2 to 8 percent slopes
89	Thoroughfare loam, 0 to 3 percent slopes
90	Tolman Variant loam, 3 to 10 percent slopes
91	Tomasaki loam, 3 to 15 percent slopes
92	Tomasaki loam, 15 to 25 percent slopes
93	Toone loam, 8 to 20 percent slopes
94	Toone-Sirref-Herm complex, 10 to 30 percent slopes
95	Trail fine sand, 0 to 5 percent slopes
96	Tukuhnik loam, 3 to 10 percent slopes
97	Ustic Torrifluvents-Ustic Torrifluvents, sodic-Typic Ustifluvents complex, 0 to 6 percent slopes
98	Ustic Torriorthents, warm, 10 to 50 percent slopes
99	Ustic Torriorthents-Lithic Torriorthents, warm-Rock outcrop complex, 10 to 80 percent slopes
100	Ustic Torriorthents-Ustollic Calciorthids complex, 10 to 60 percent slopes
101	Ustic Torriorthents-Ustollic Haplargids complex, 10 to 60 percent slopes
102	Waas very fine sandy loam, 2 to 8 percent slopes
103	Windwhistle very fine sandy loam, 1 to 6 percent slopes
104	Windwhistle-Sazi very fine sandy loams, 1 to 3 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Small Airport; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 1283

RAILROAD — Railroad

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small — water; w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 15 16

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

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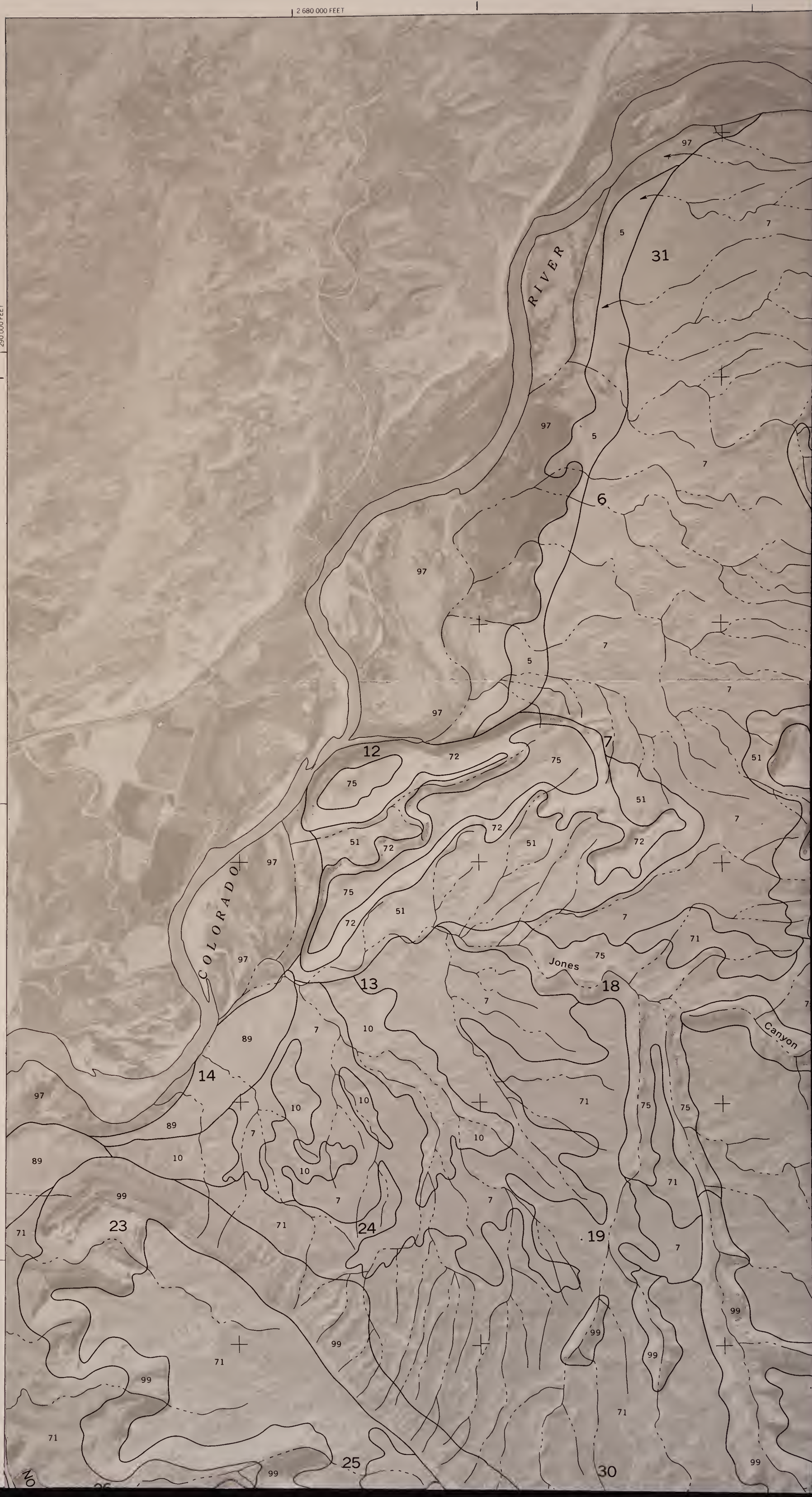

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SHEET NO. 1
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

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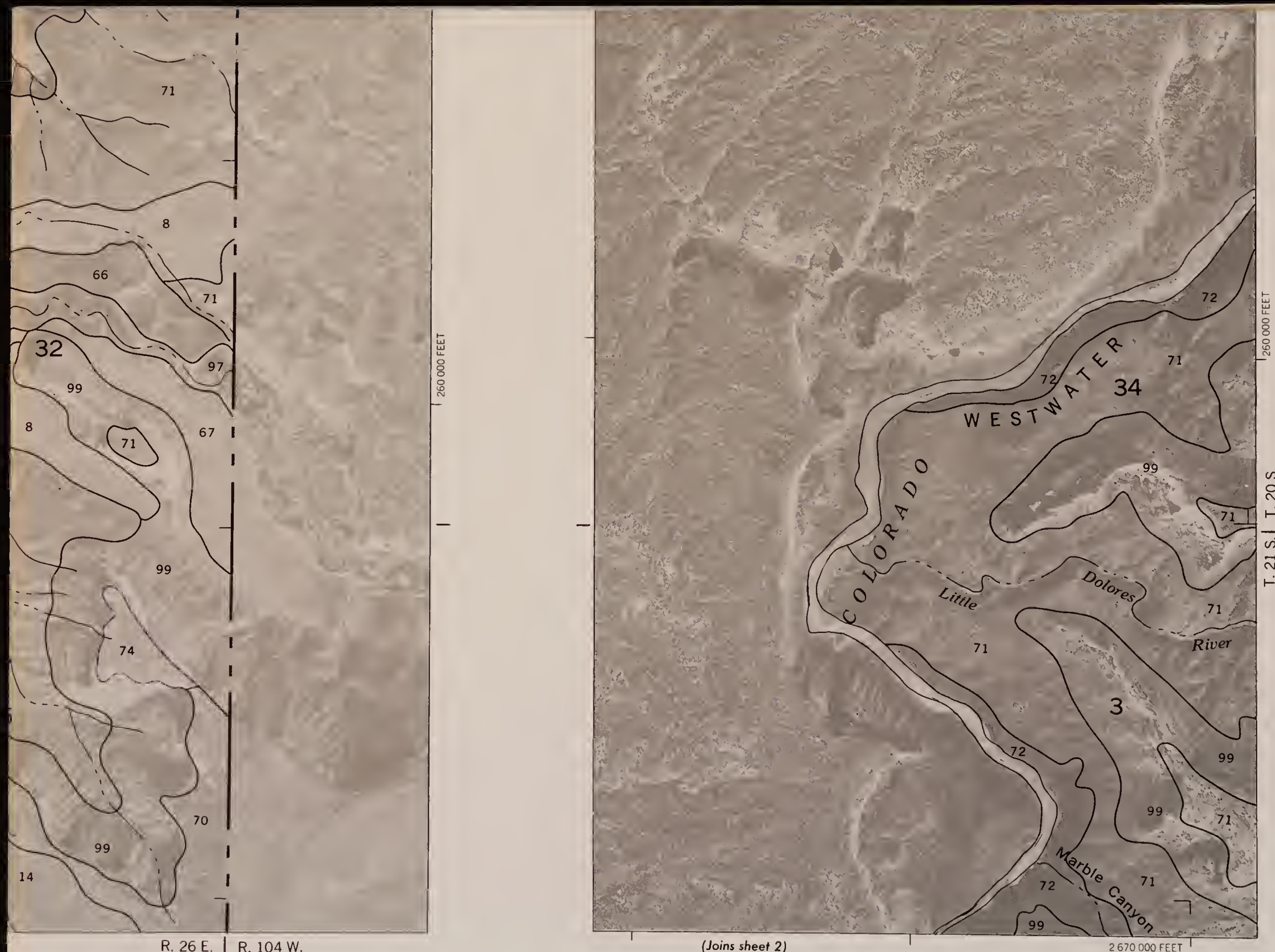
CANYONLANDS AREA, UTAH, PARTS OF



1
2 MILES
1
2 KILOMETERS
24 000

GRAND AND SAN JUAN COUNTIES NO. 1

SHEET NO. 1 OF 57

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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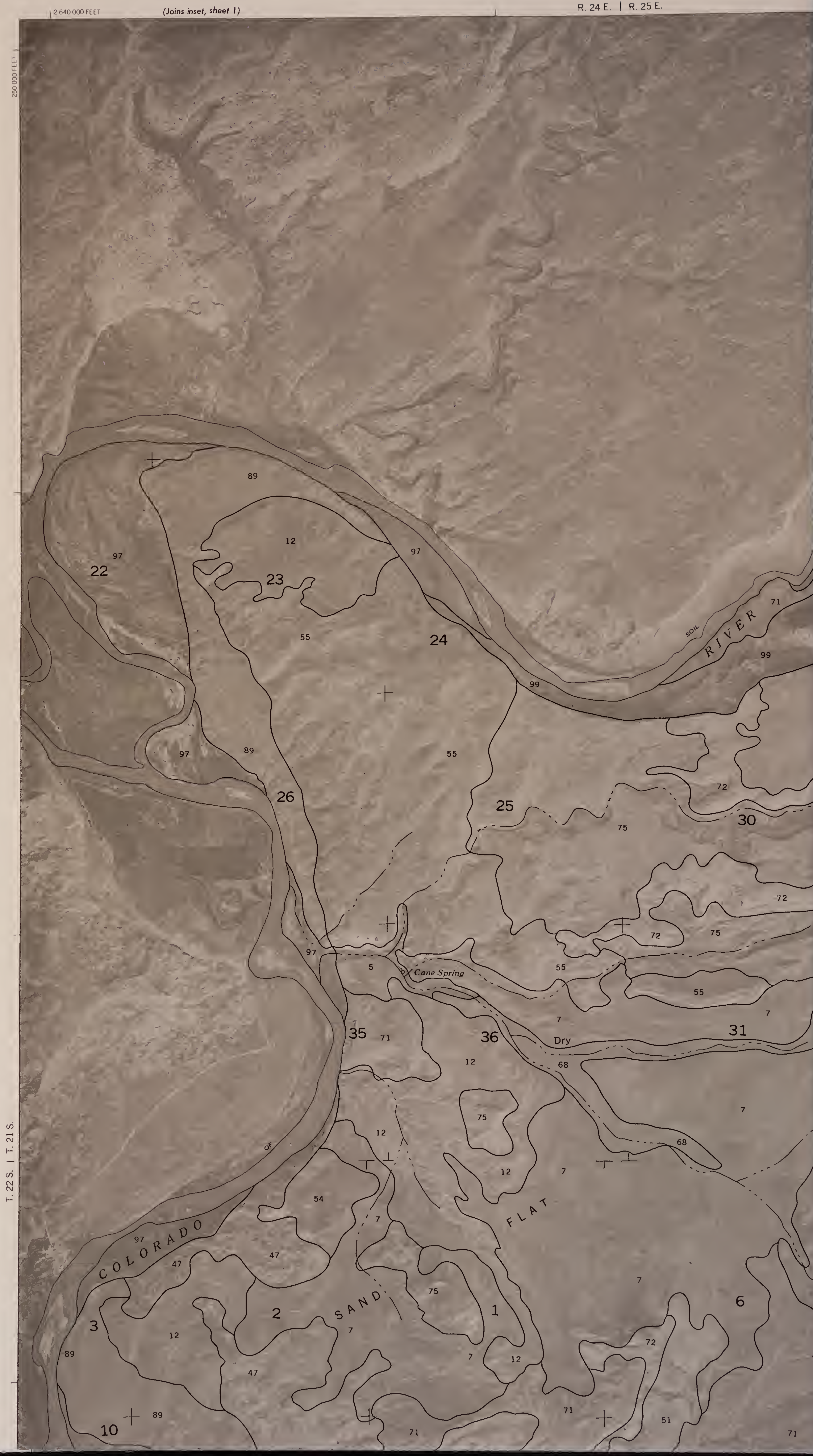
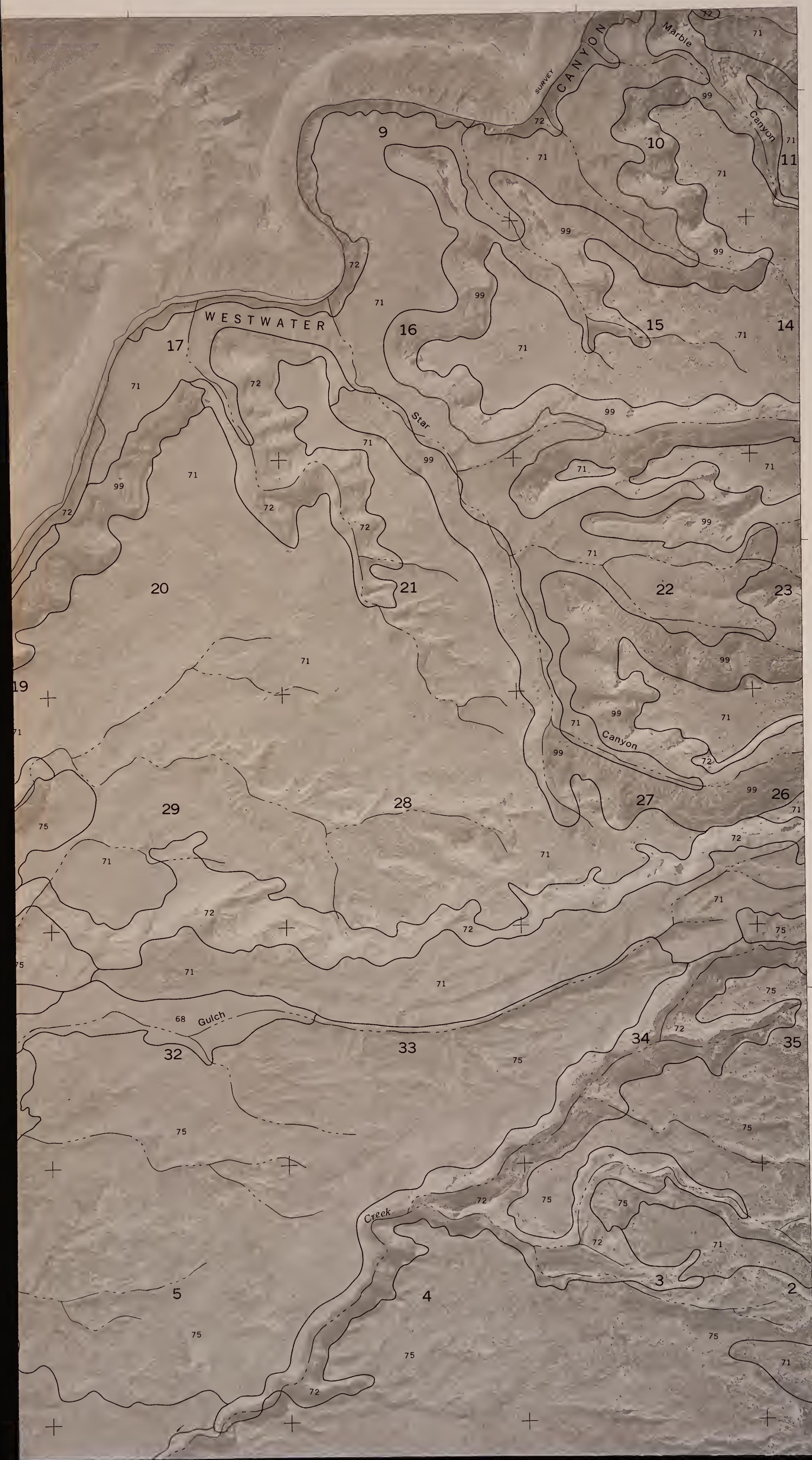


SHEET NO. 2
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



T. 22 S. | T. 21 S.

(Joins sheet 3)

(Joins inset A, sheet 4)

(Joins sheet 5)

R. 24 E. | R. 25 E.

1 3/4 1/2 1/4 0

1 0.5 0 1

SCALE 1:24 000

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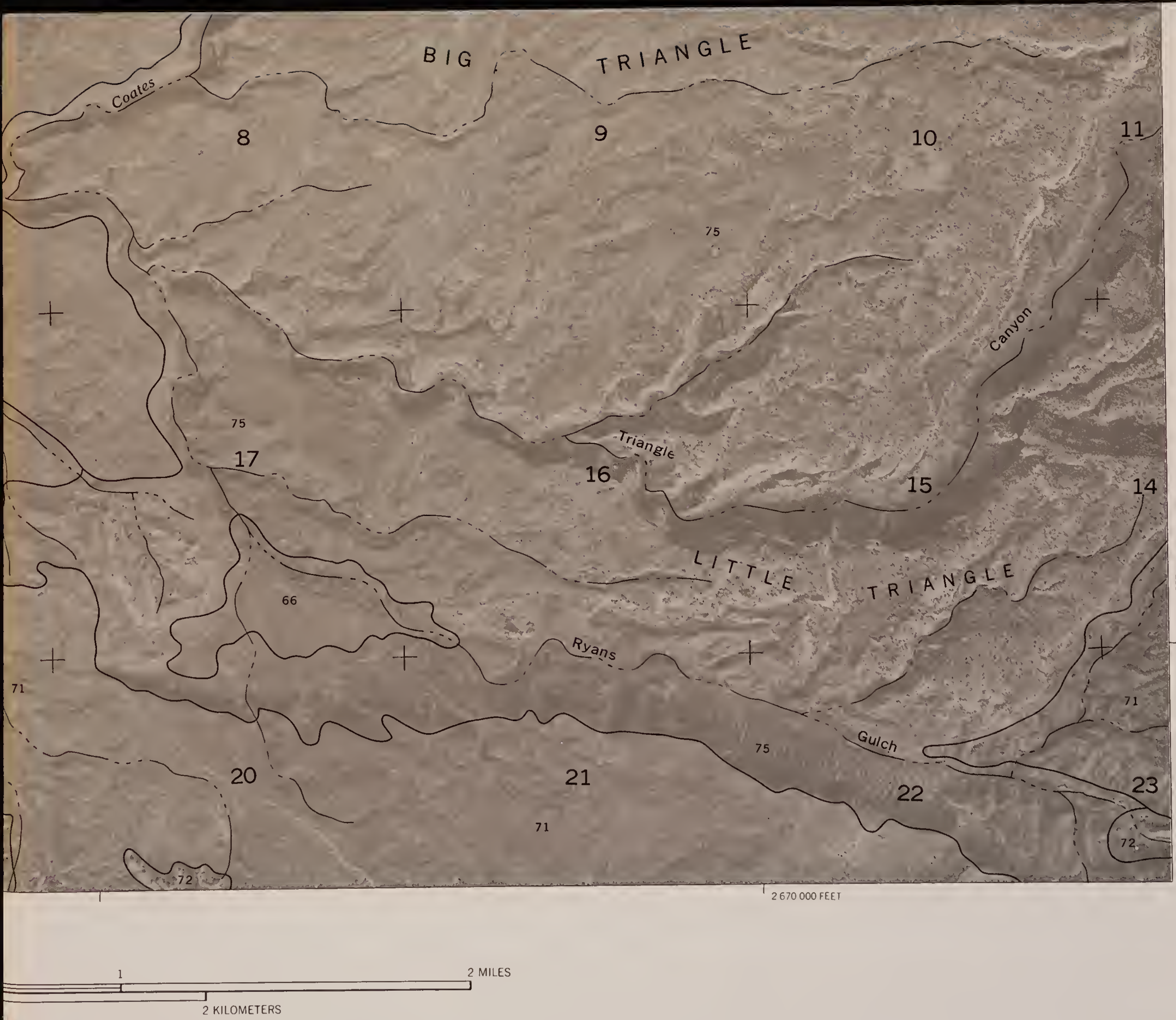

AND SAN JUAN COUNTIES NO. 2

SHEET NO. 2 OF 57

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

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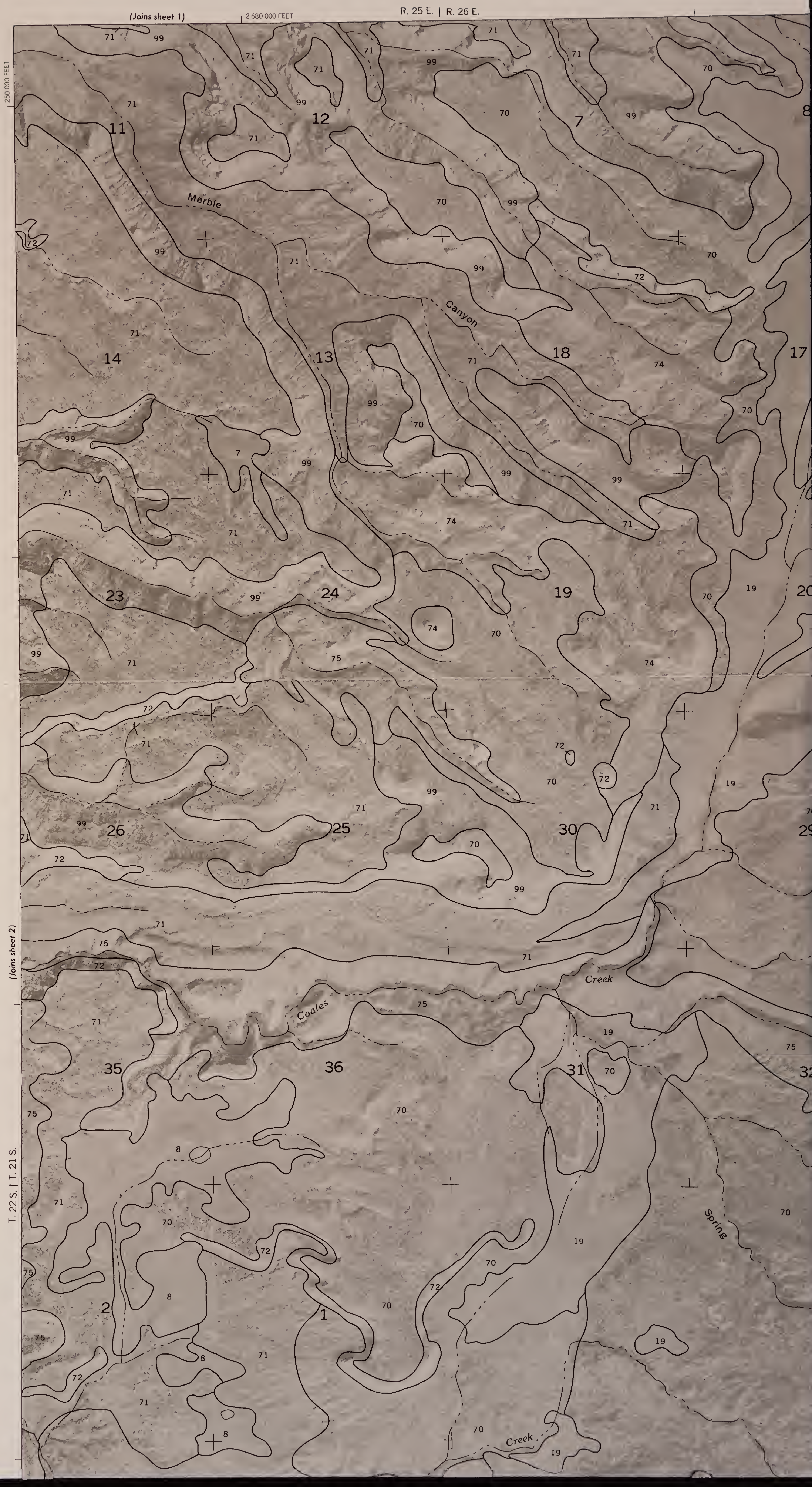
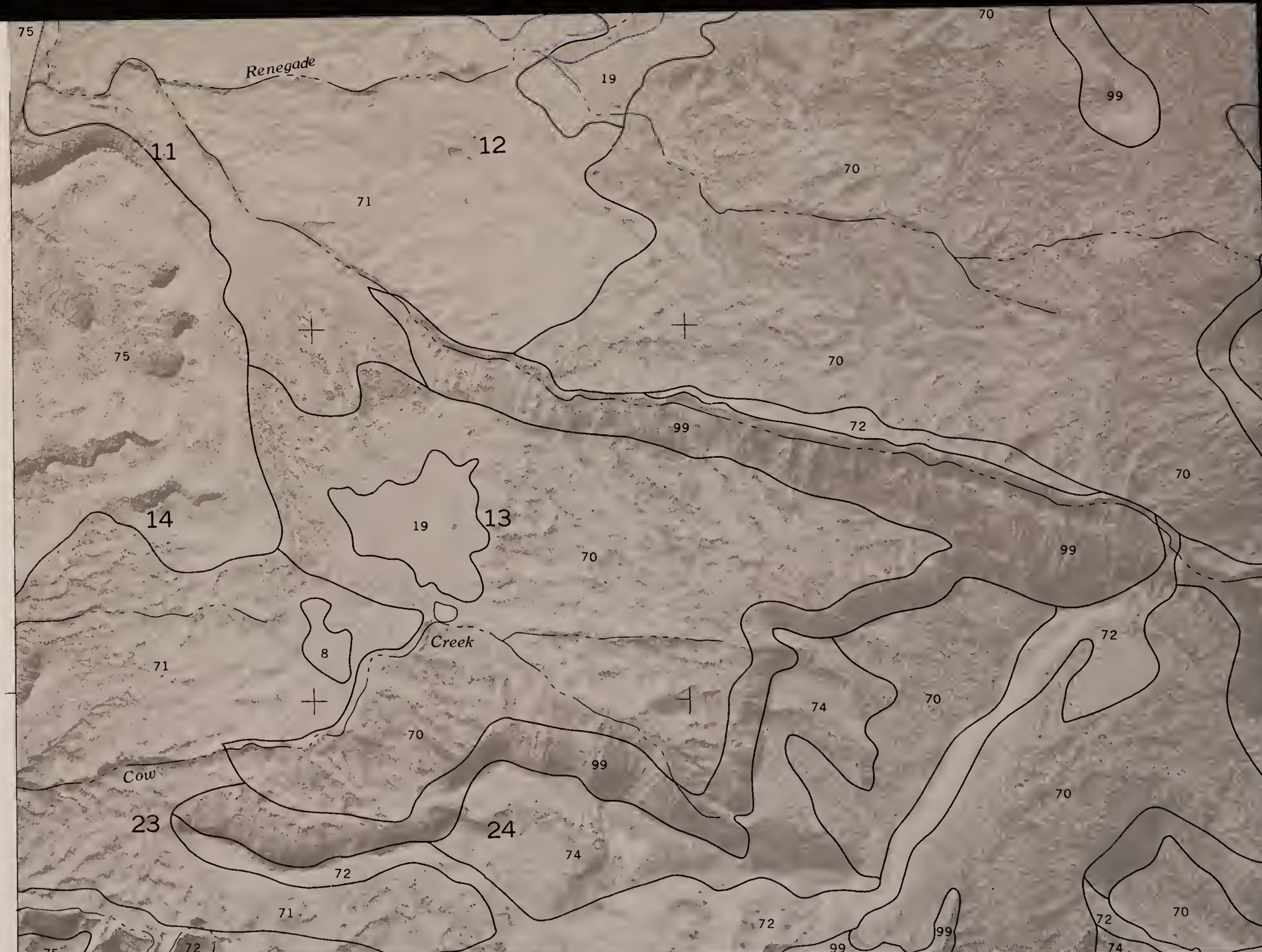
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 3

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



(Joins sheet 6)

R. 25 E. | R. 26 E.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

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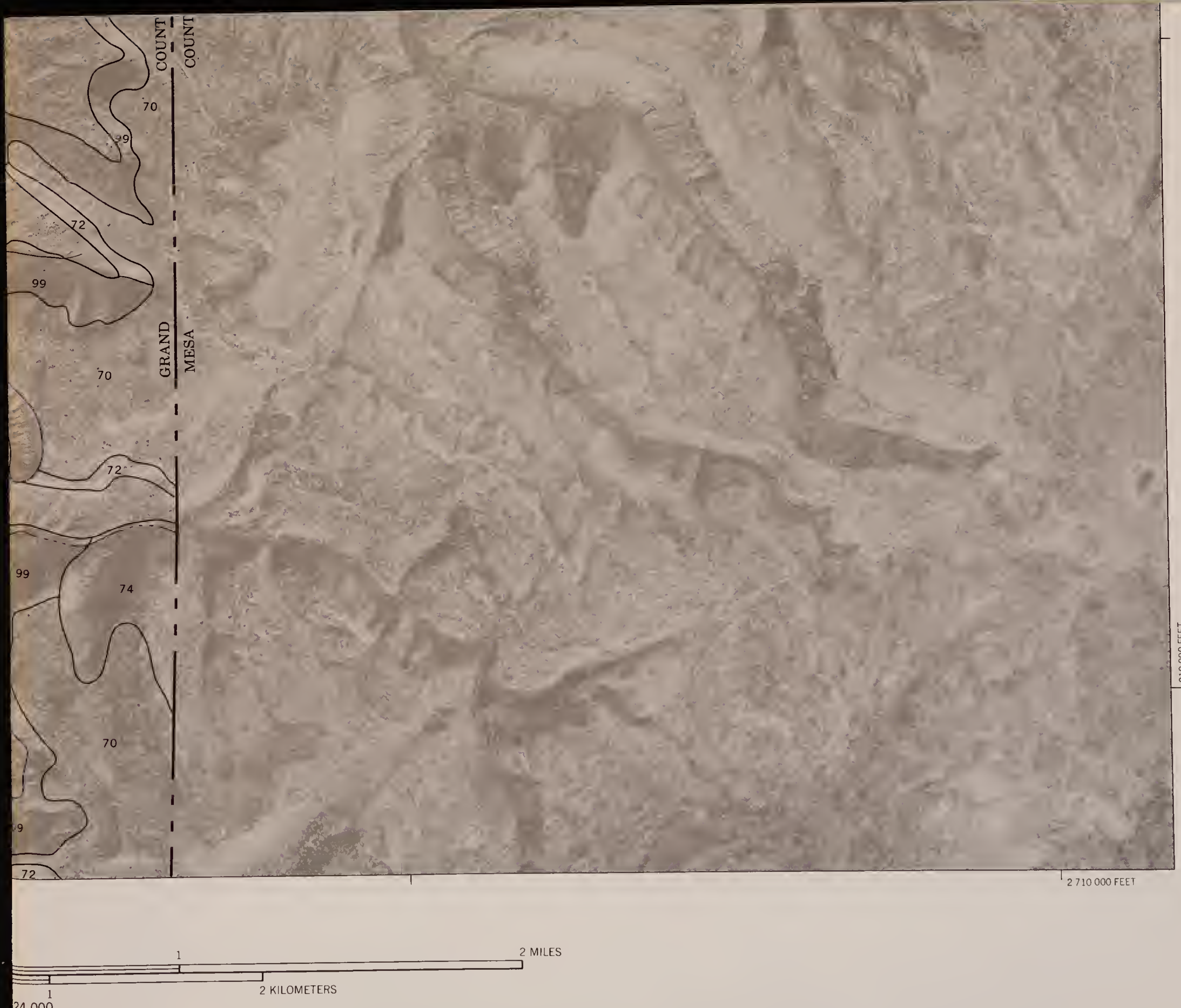

GRAND AND SAN JUAN COUNTIES NO. 3

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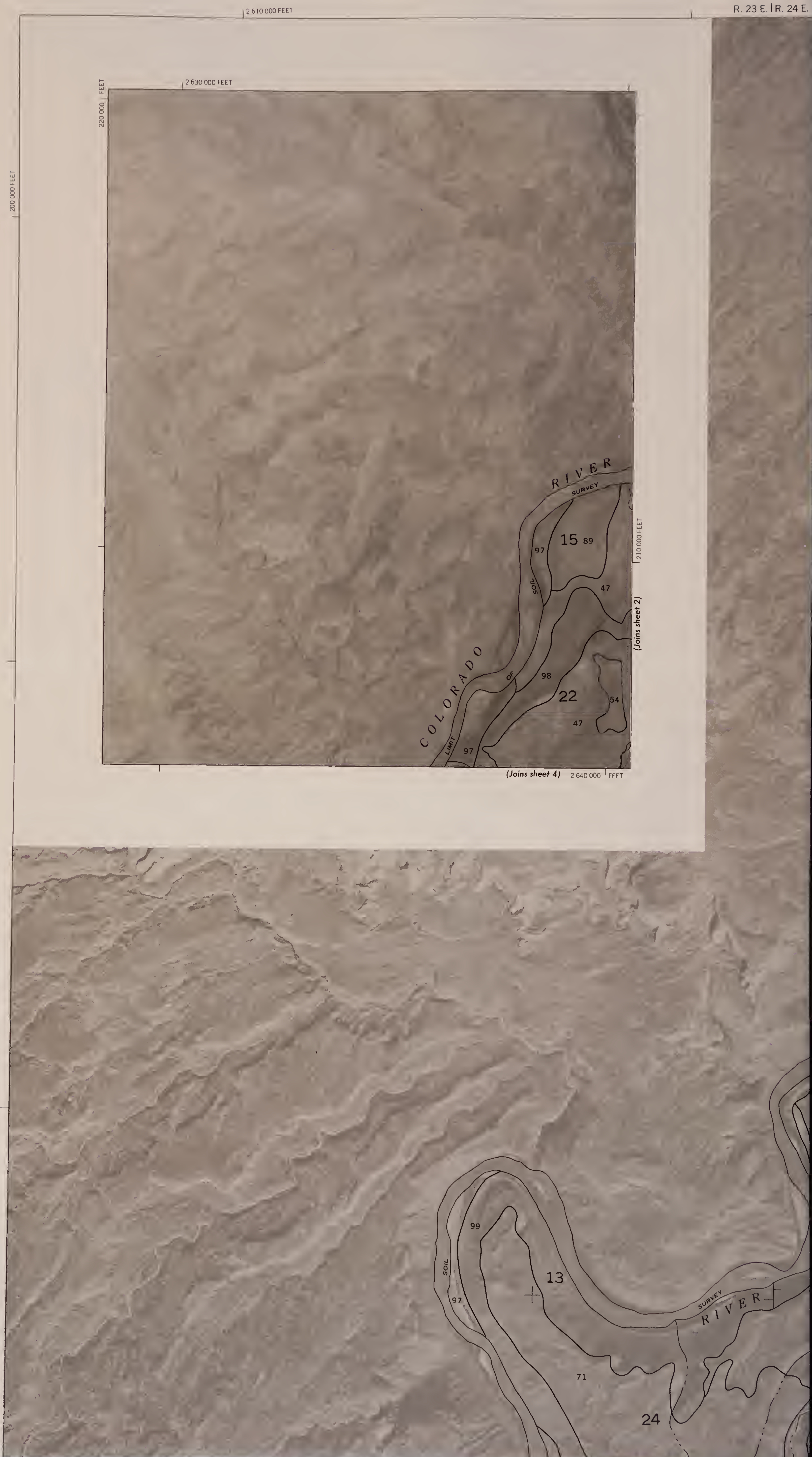
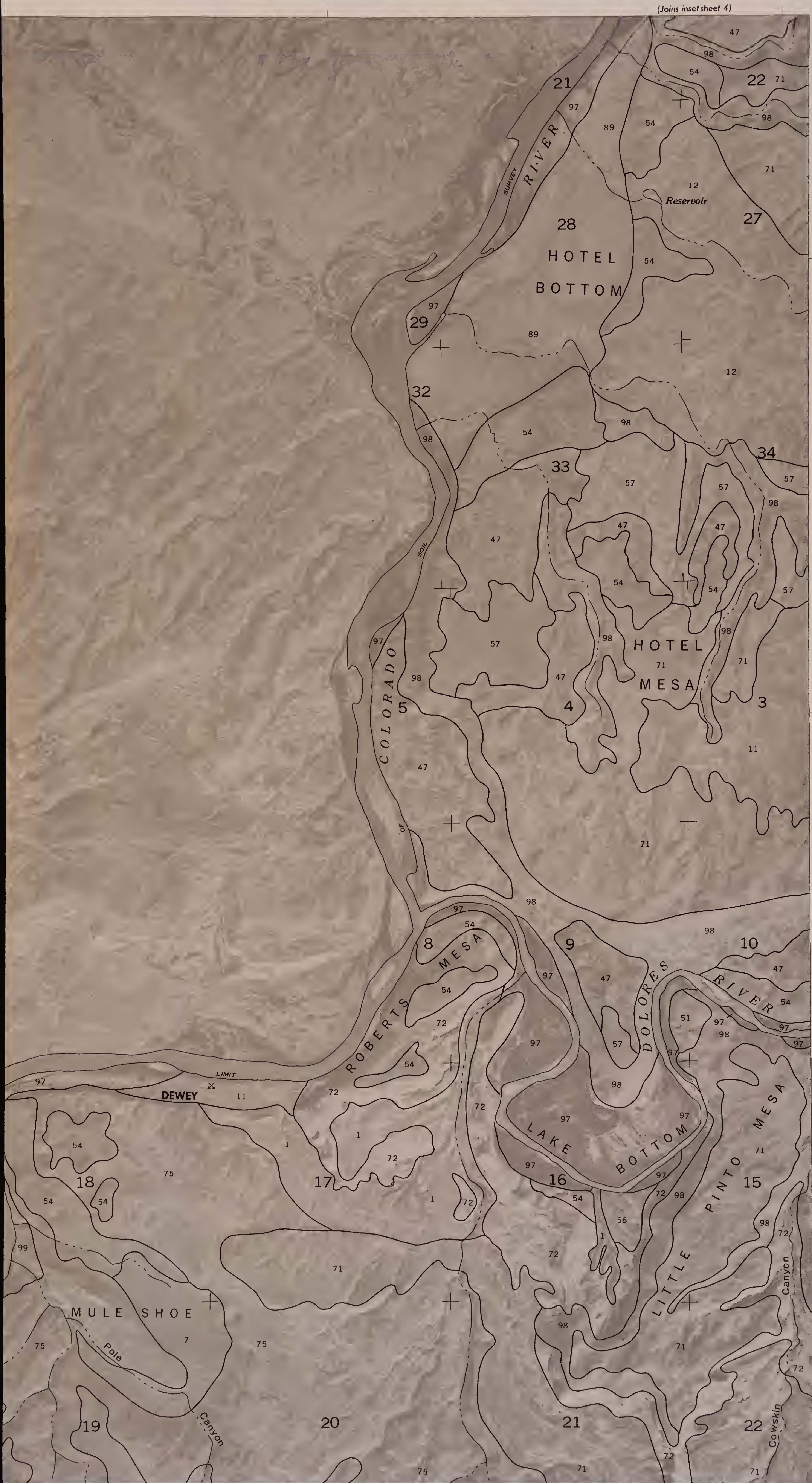
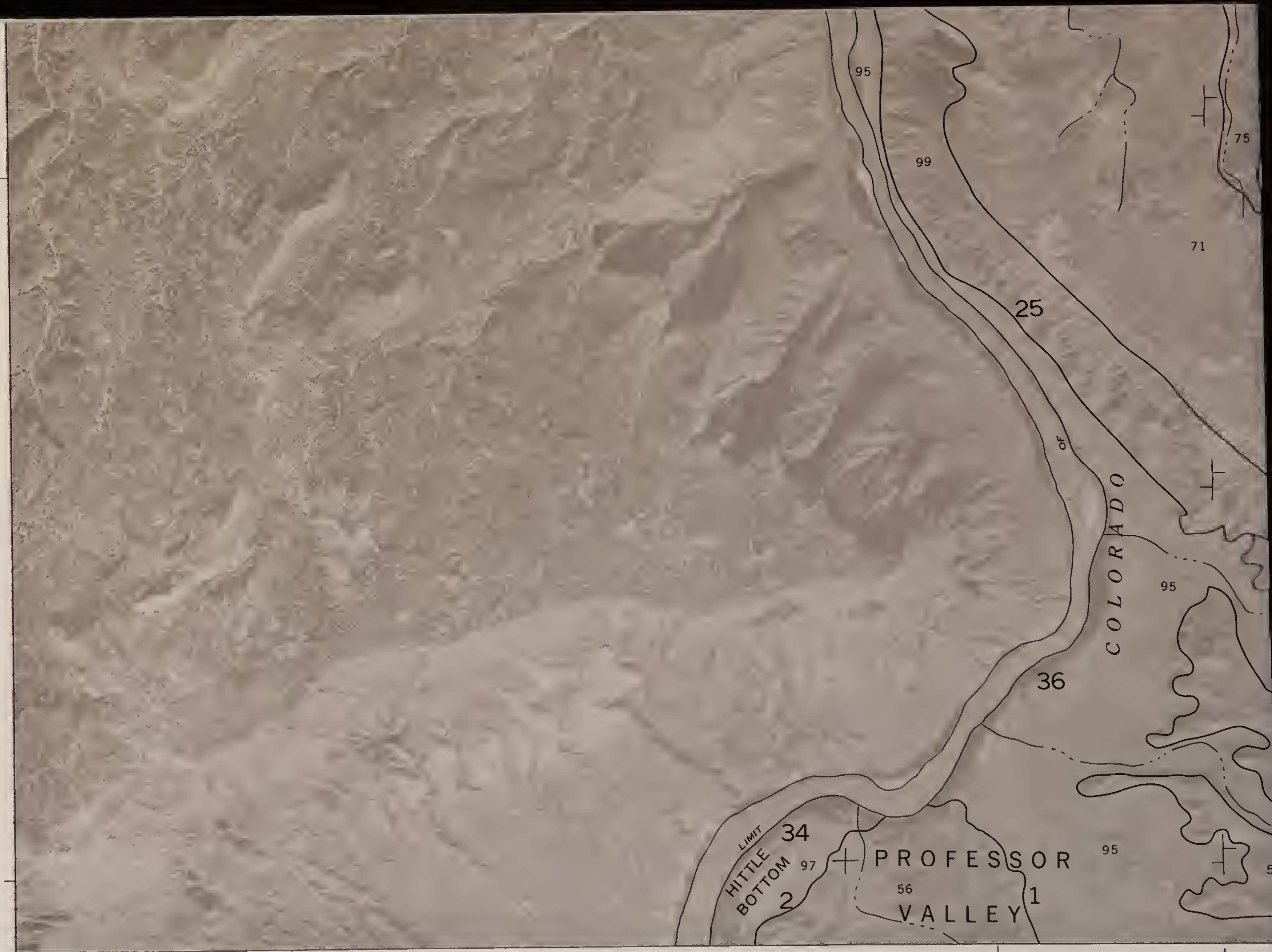
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





T. 24 S. | T. 23 S.

R. 23 E. | R. 24

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

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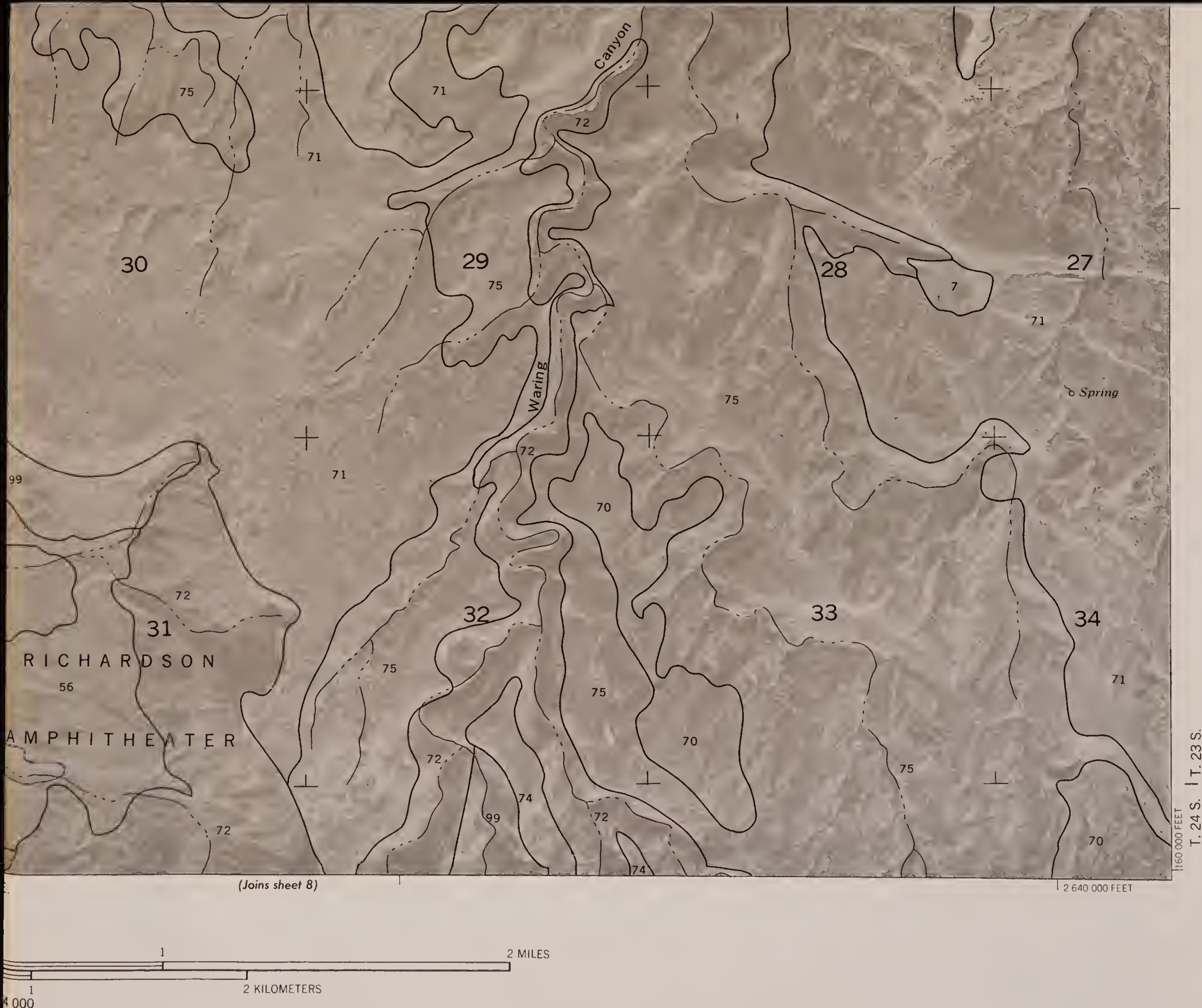
CANYONLANDS AREA, UTAH, PARTS OF



RAND AND SAN JUAN COUNTIES NO. 4

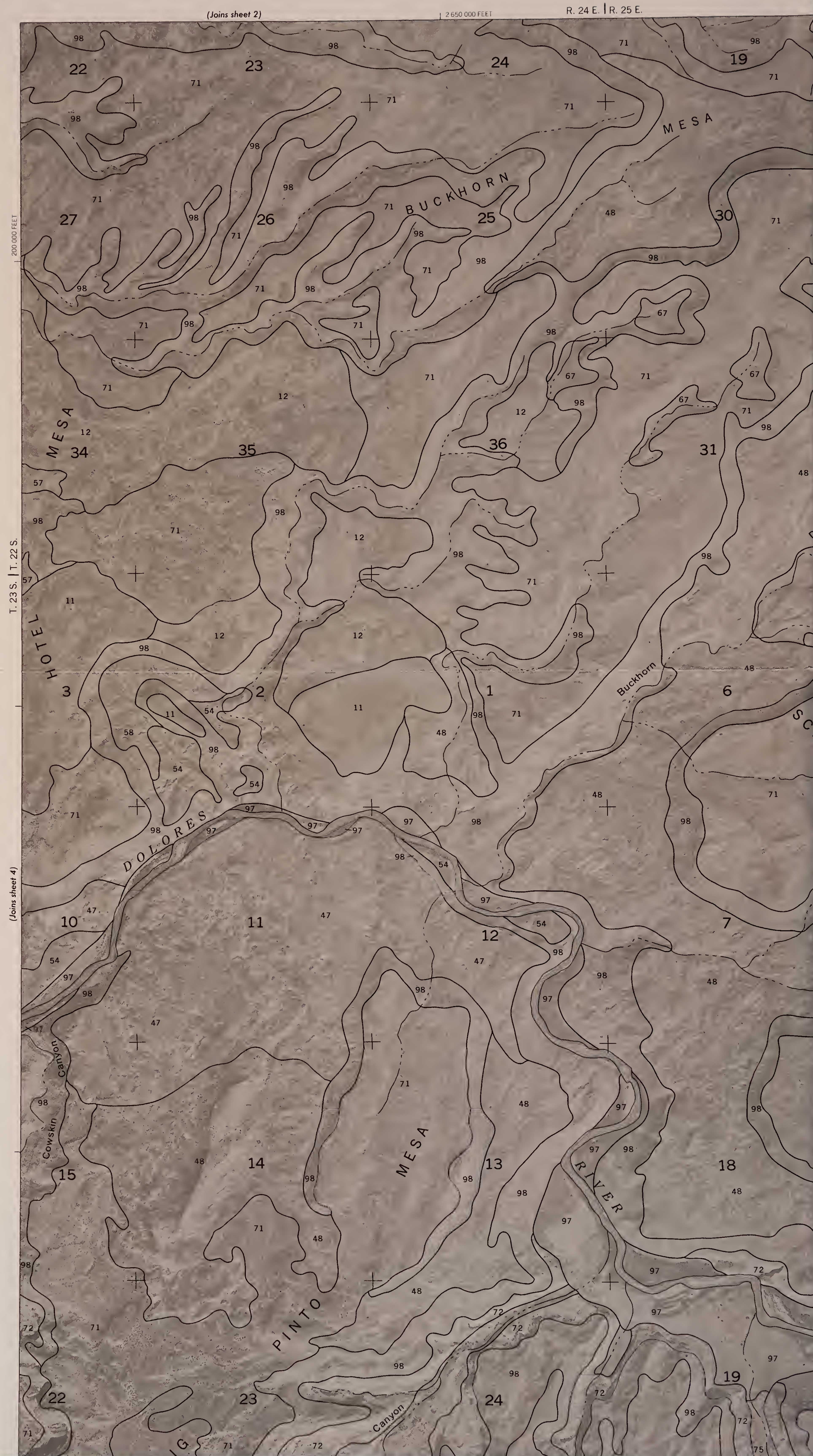
#24363150 ID: 88071562

S
599
.U8
C36
1991

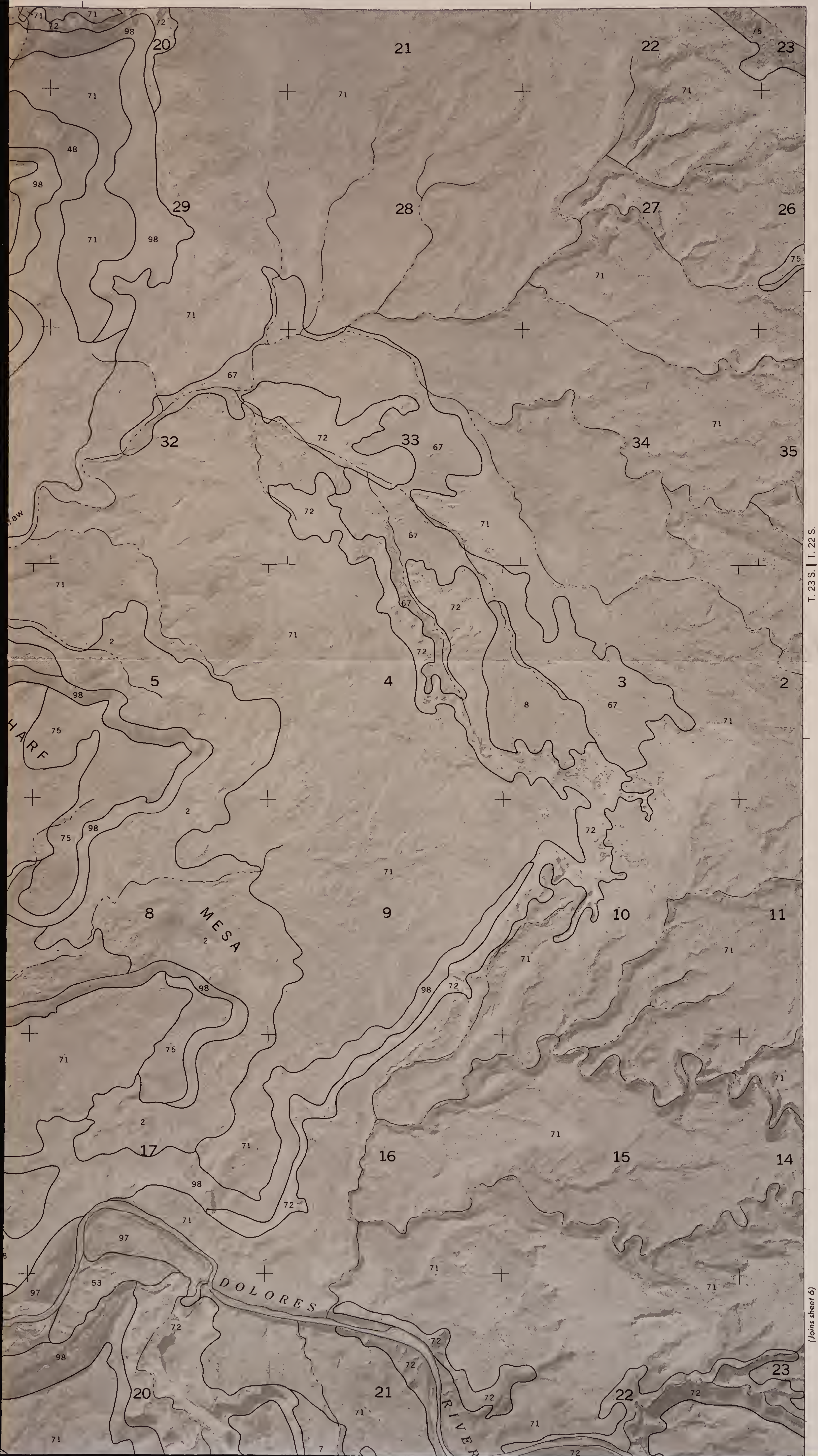
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

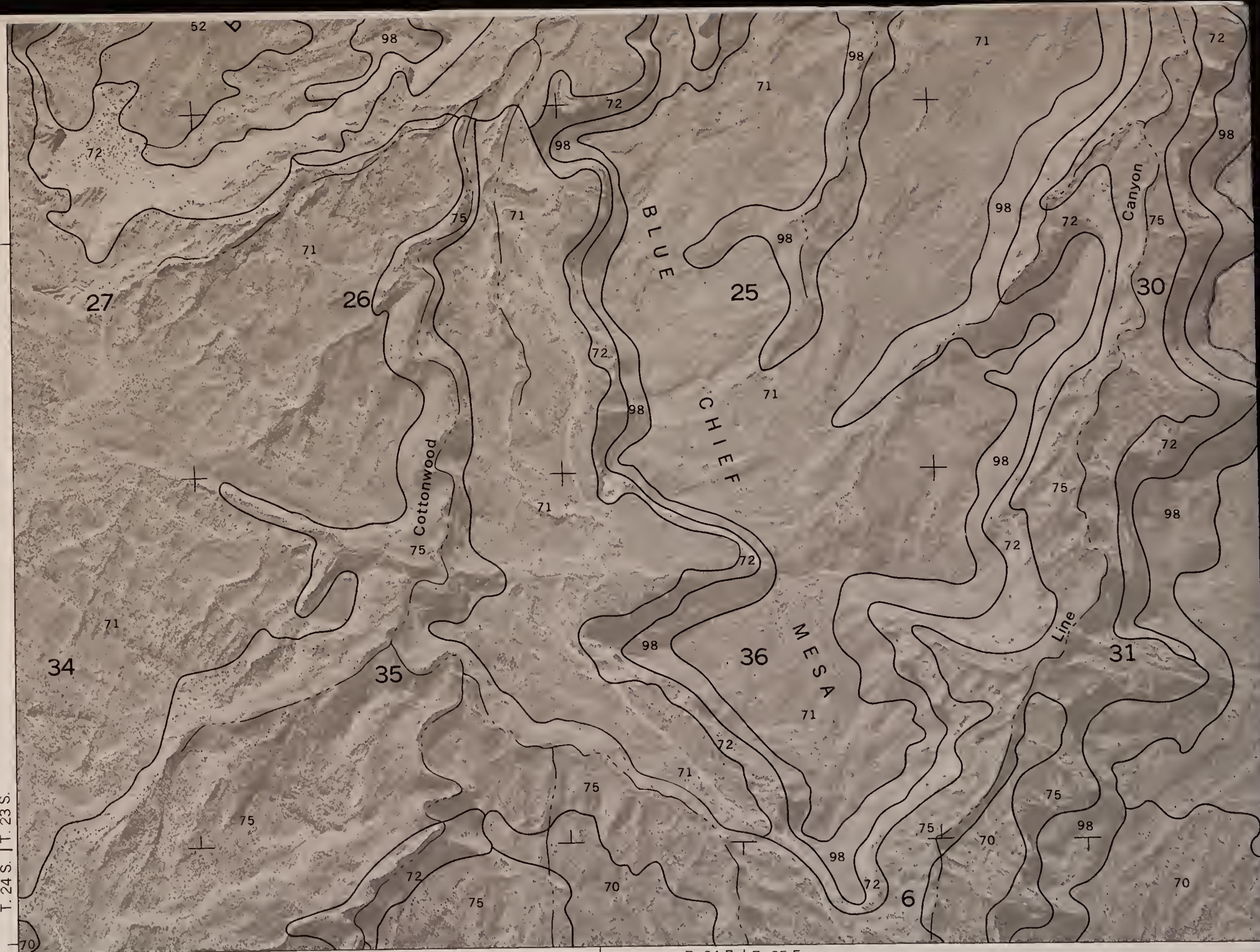
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



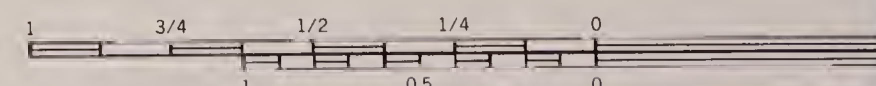
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





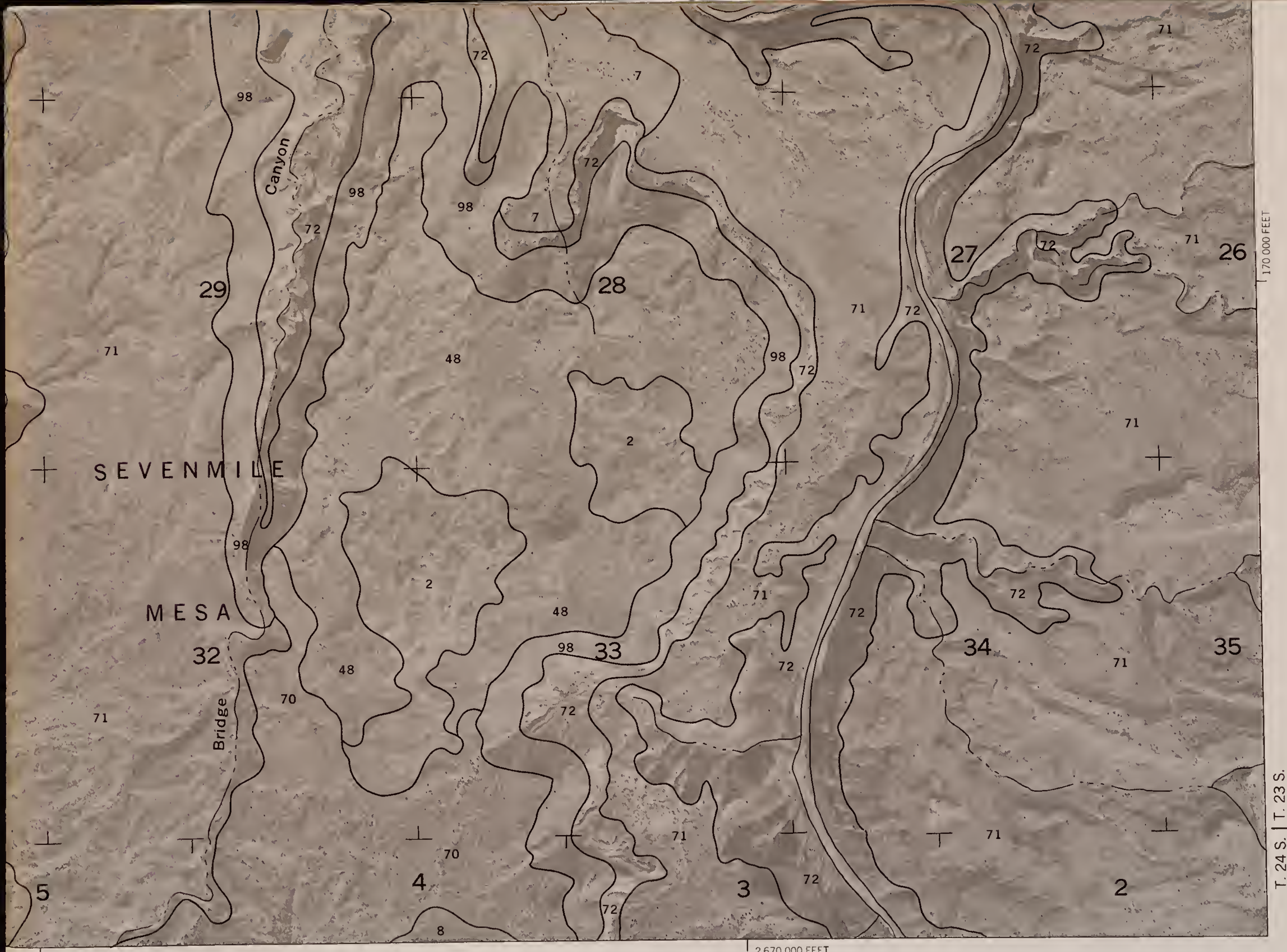
(Joins sheet 9)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SCALE 1:

CANYONLANDS AREA, UTAH, PARTS OF



1 2 MILES

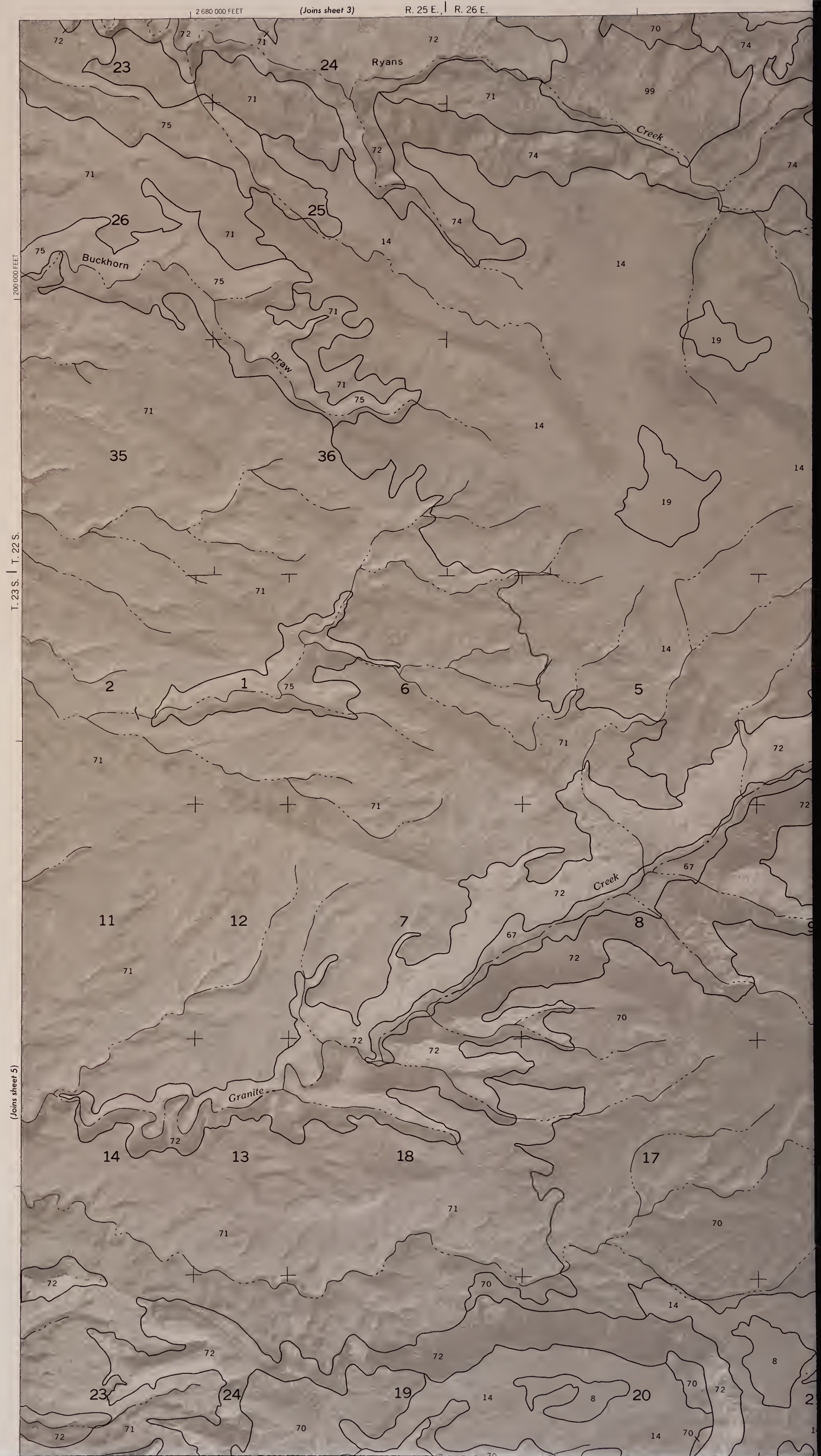
1 2 KILOMETERS

4 000

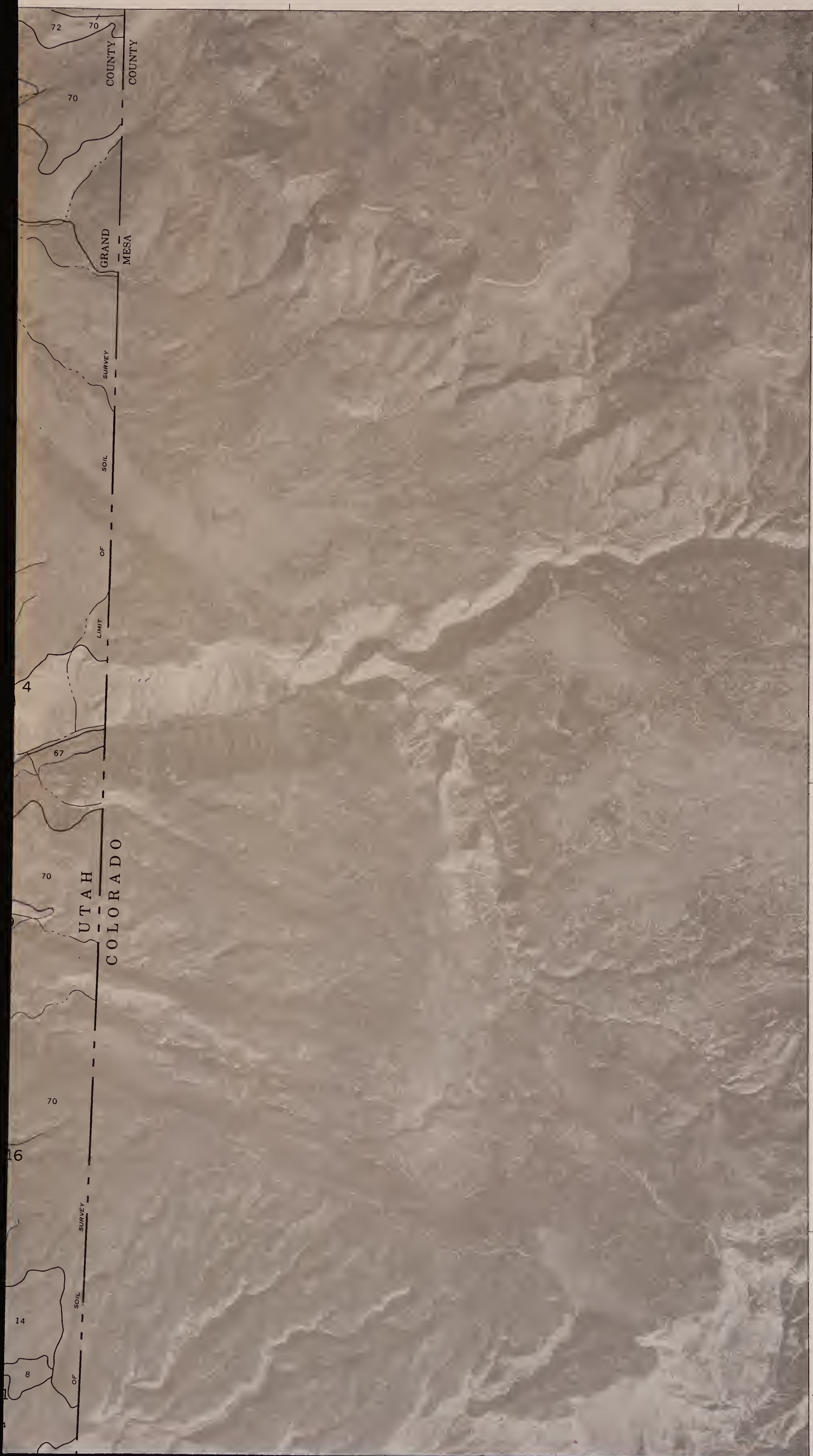
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

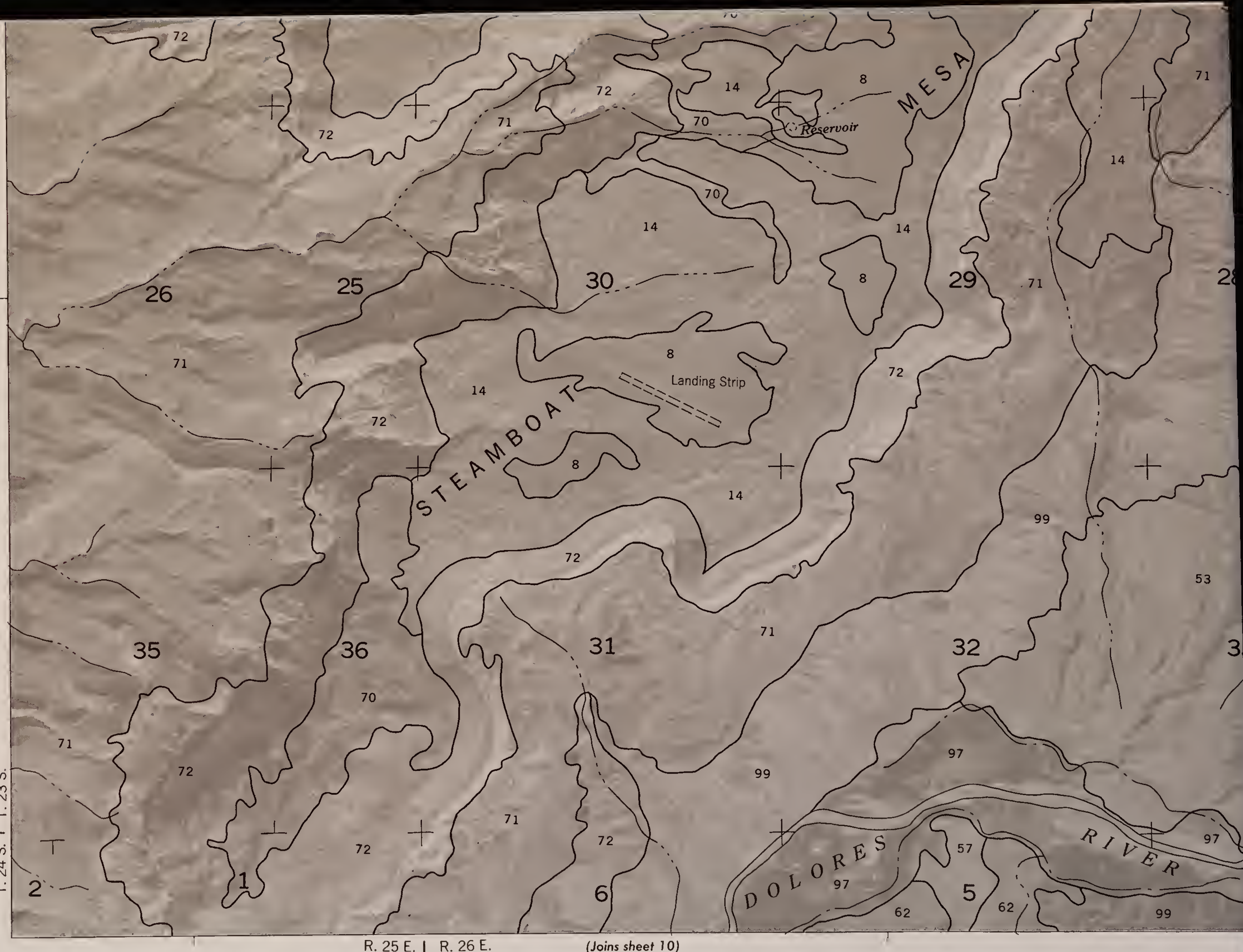
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 6
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





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CANYONLANDS AREA, UTAH, PARTS OF

1 2 MILES

1 2 KILOMETERS

4 000

RAND AND SAN JUAN COUNTIES NO. 6

SHEET NO. 6 OF 57

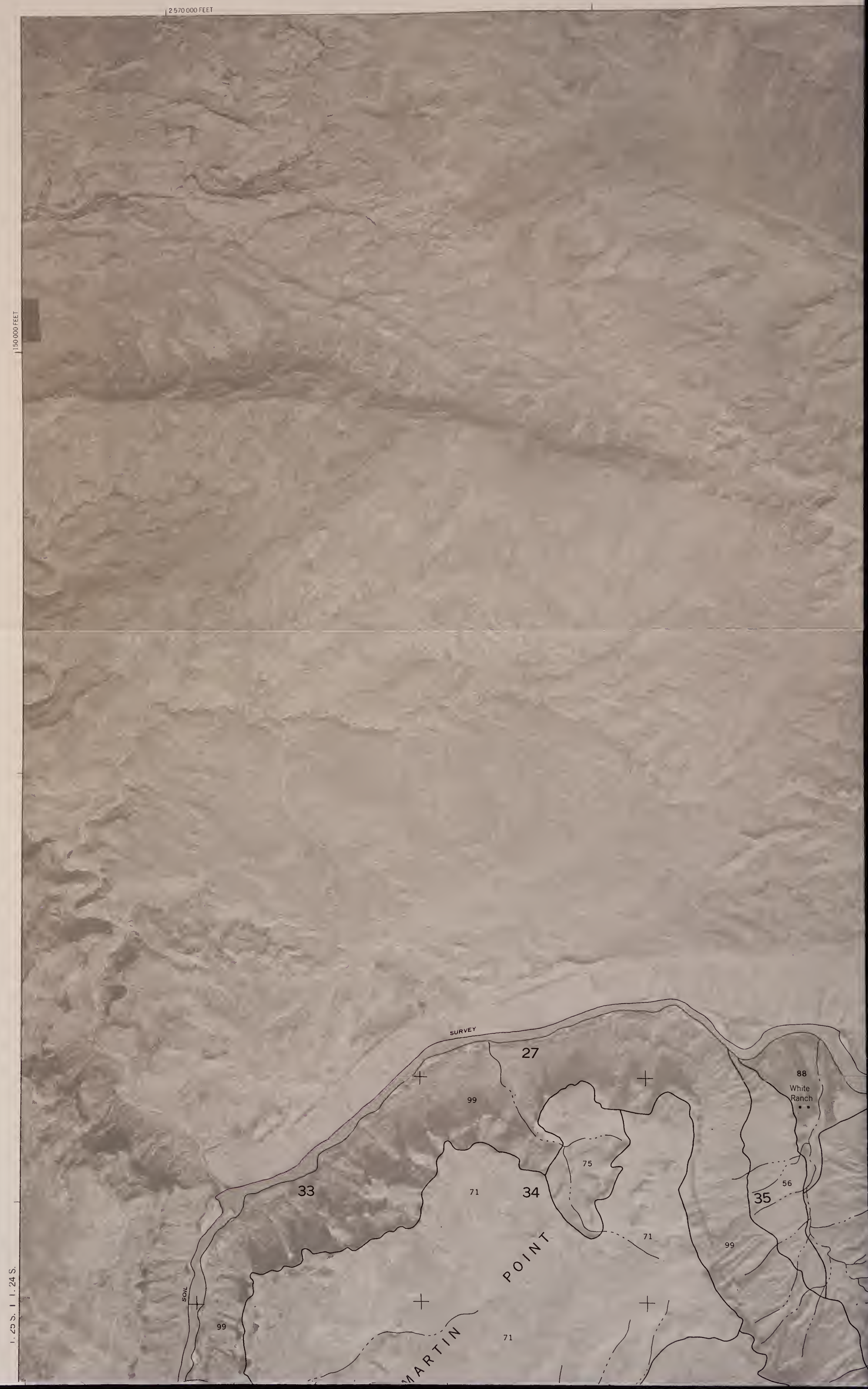
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

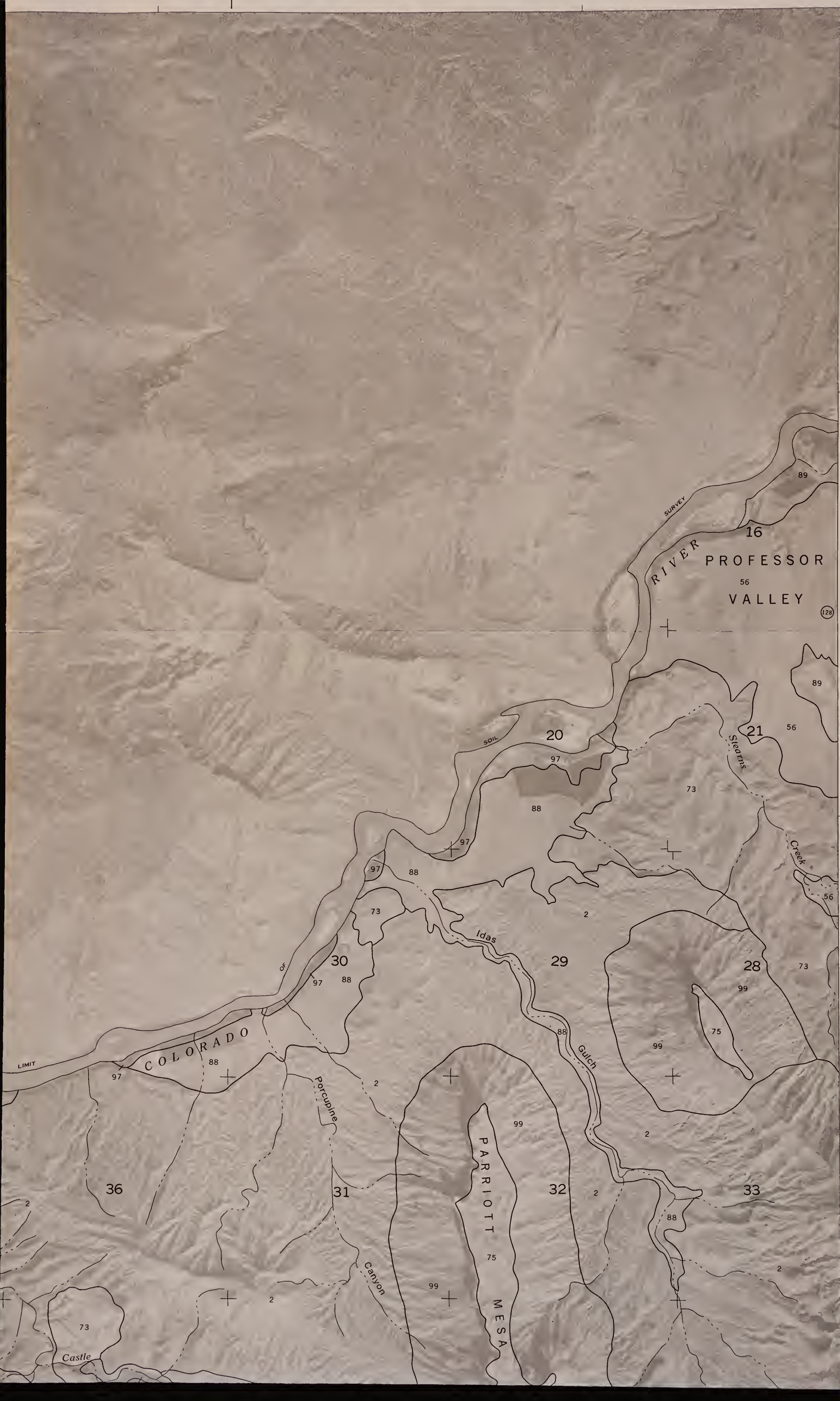
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1 24 000

This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography Coordinate grid ticks and land division corners, if shown, are approximately positioned

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

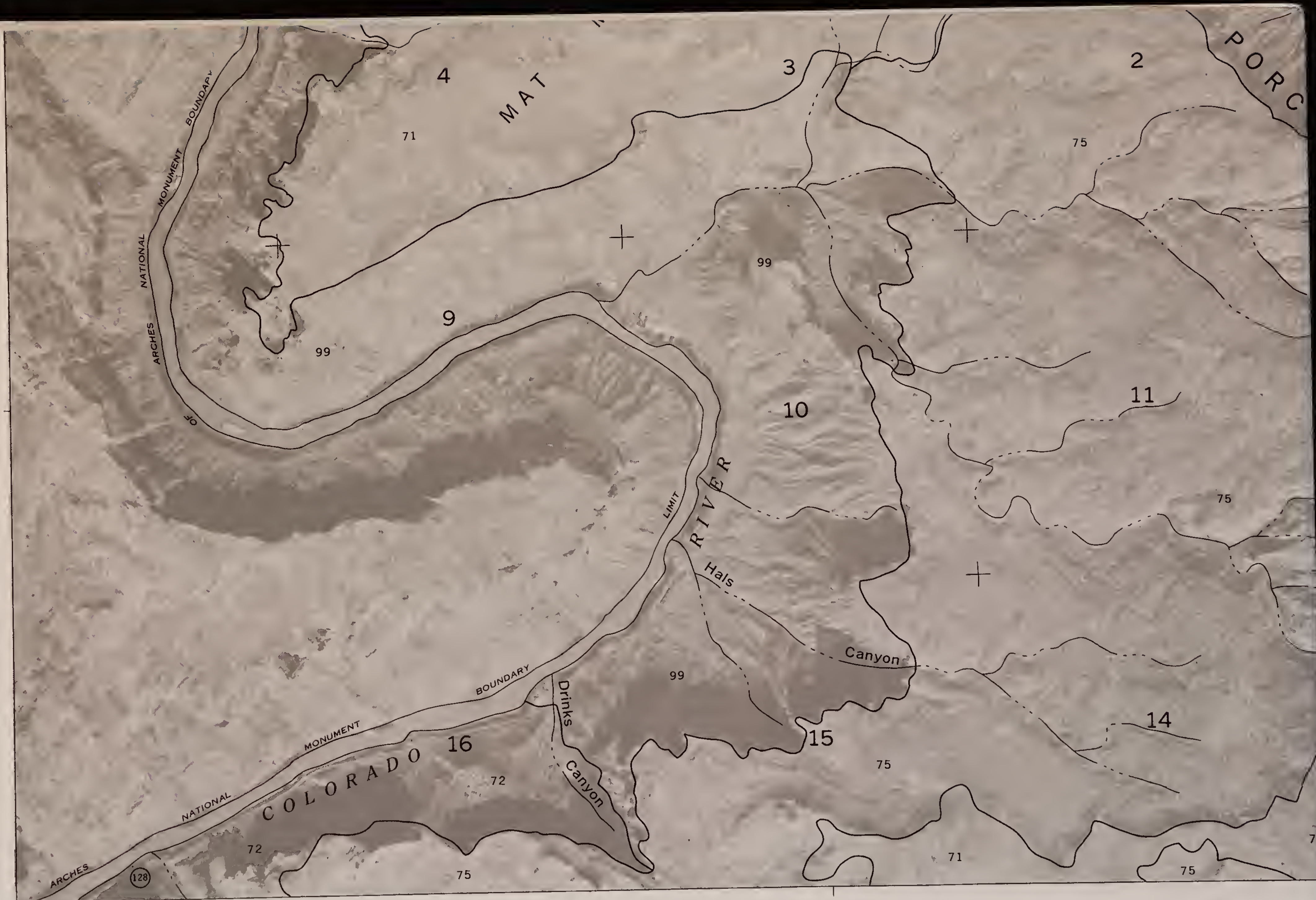


#24363150 ID: 88071562



(Joins sheet 8)

T. 25 S. | T. 24 S.



(Joins sheet 12)

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

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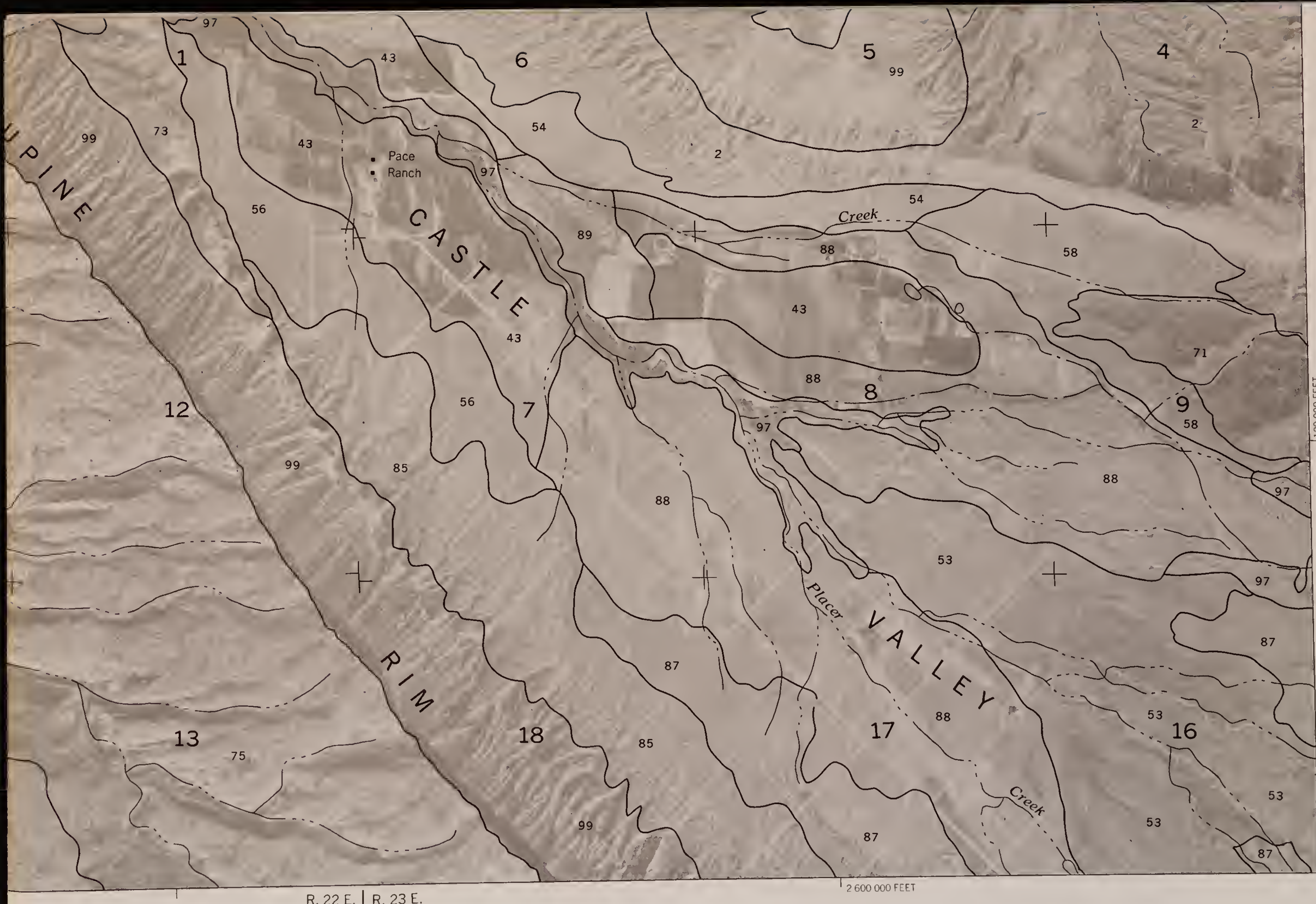
CANYONLANDS AREA, UTAH, PARTS OF


UPINE
Pace
Ranch
CASTLE
Creek
Placer
VALLEY
Creek
RIM
1
5
6
4
7
8
9
12
13
16
17
18
120 000 FEET
2 600 000 FEET
R. 22 E. | R. 23 E.


1
2 MILES
1
2 KILOMETERS
24 000

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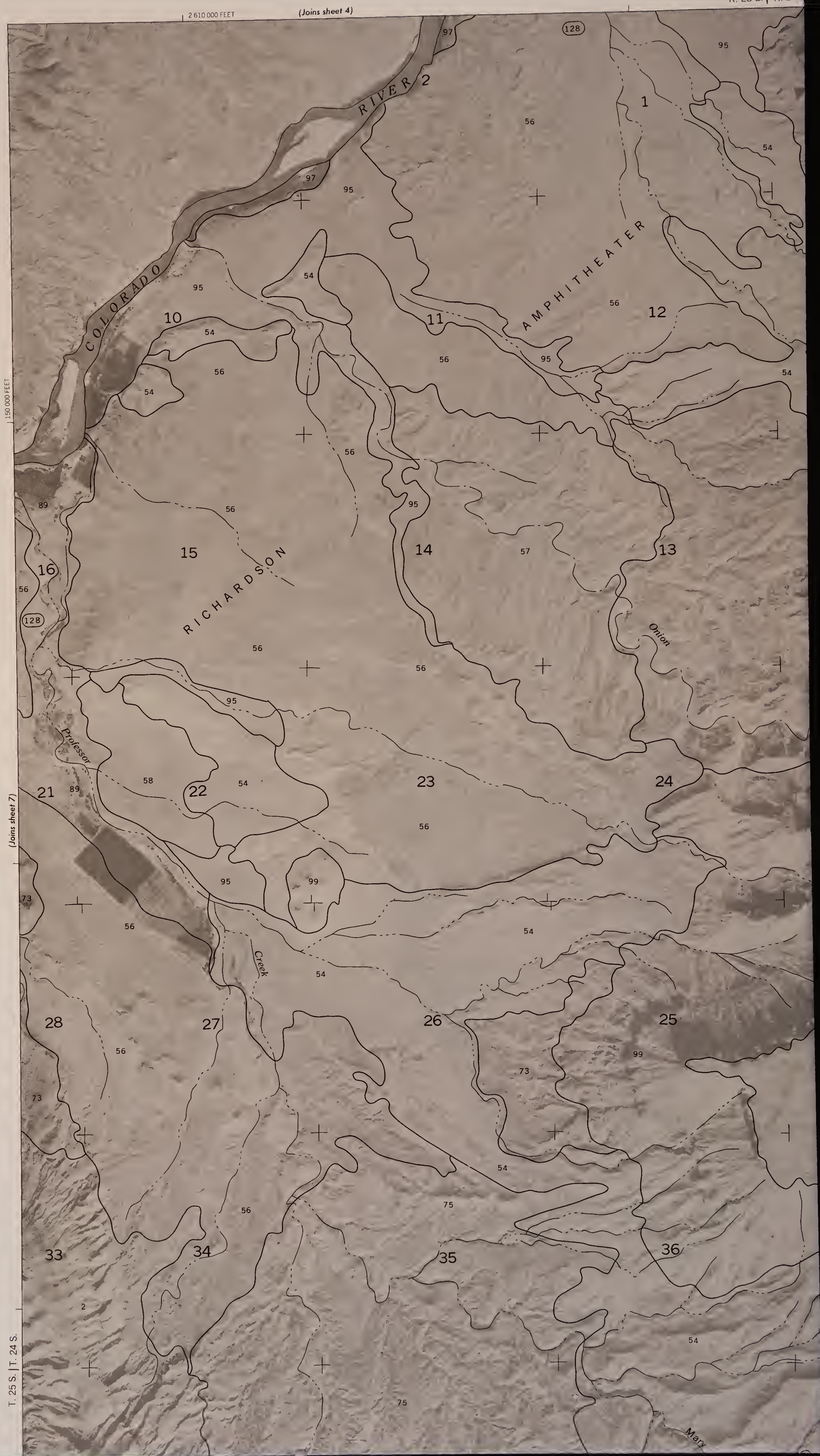
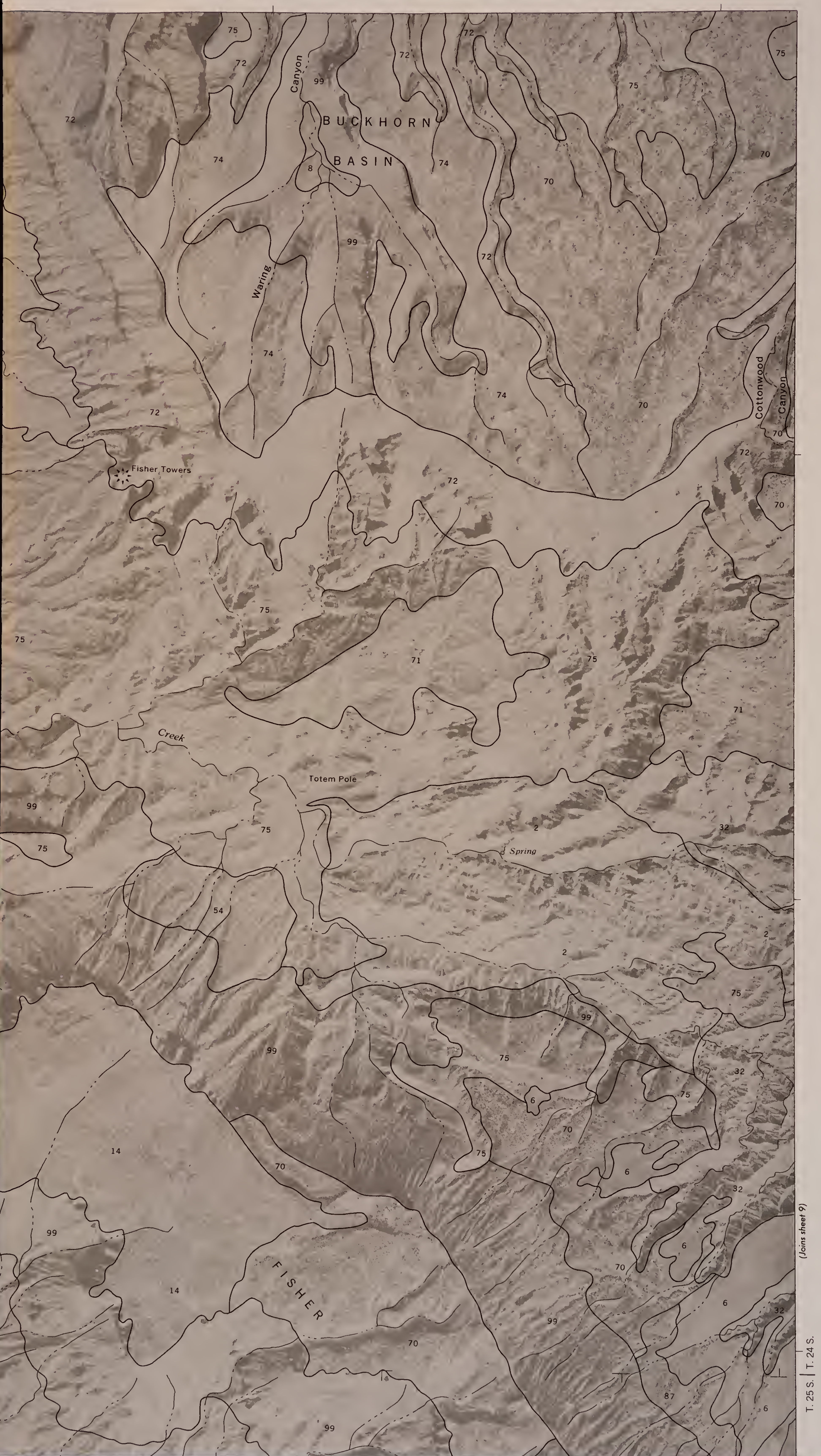
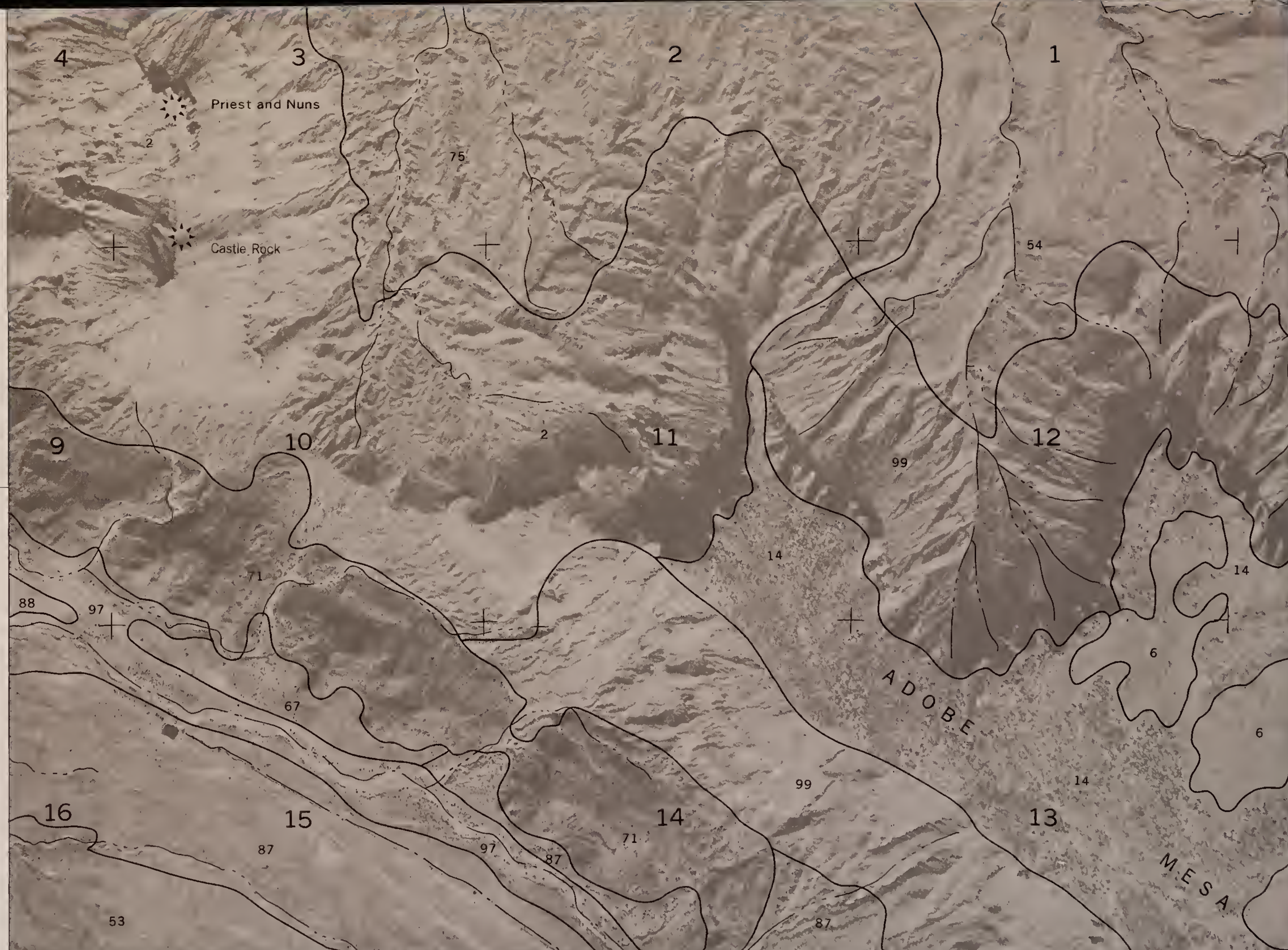
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 8
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





(Joins sheet 13)

R. 23 E. | R. 24 E.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:2

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CANYONLANDS AREA, UTAH, PARTS OF

1
2 MILES
1
2 KILOMETERS
4 000

GRAND AND SAN JUAN COUNTIES NO. 8

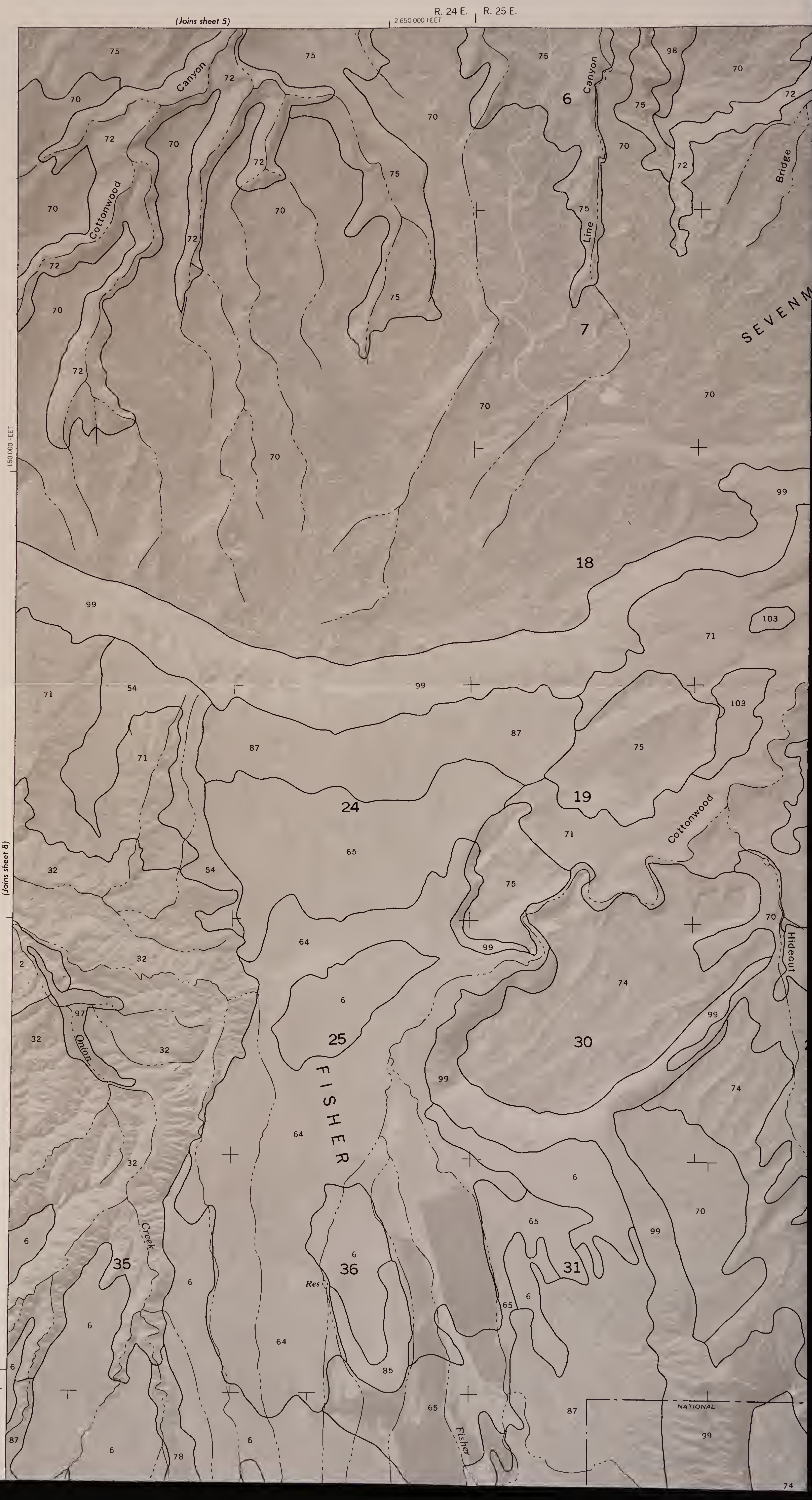
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

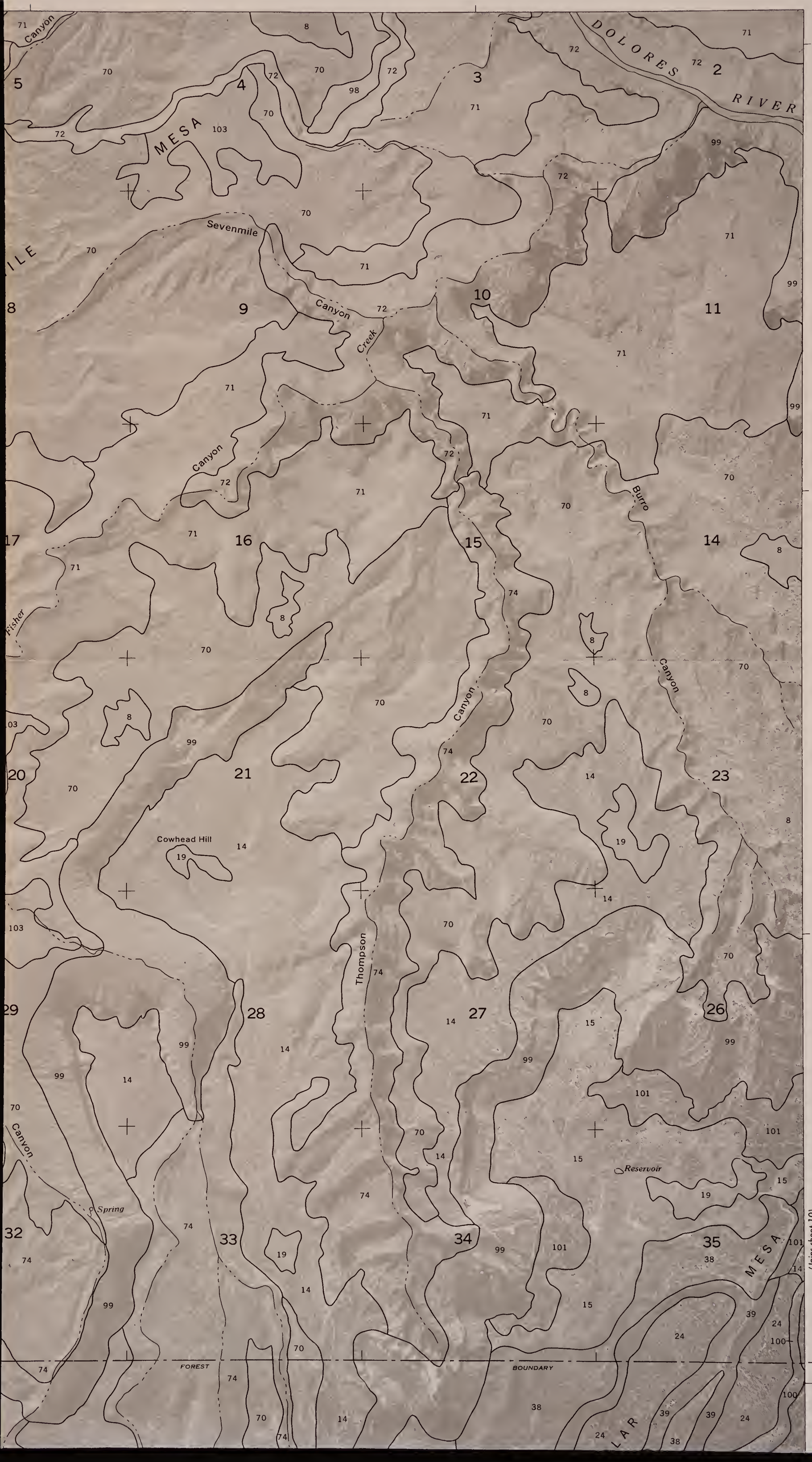
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

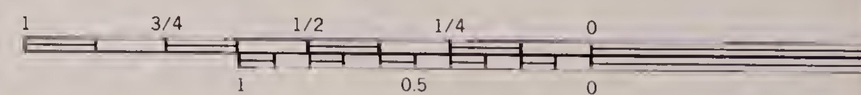
SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE




DOLORES RIVER
MESA
ILE
Sevenmile
Canyon
Creek
Burro
Canyon
Fisher
Cowhead Hill
Thompson
Reservoir
Spring
FOREST
BOUNDARY
LAR
(Joins sheet 10)
T. 24 S.
T. 25 S.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS OF

1
2 MILES
1
2 KILOMETERS
24 000

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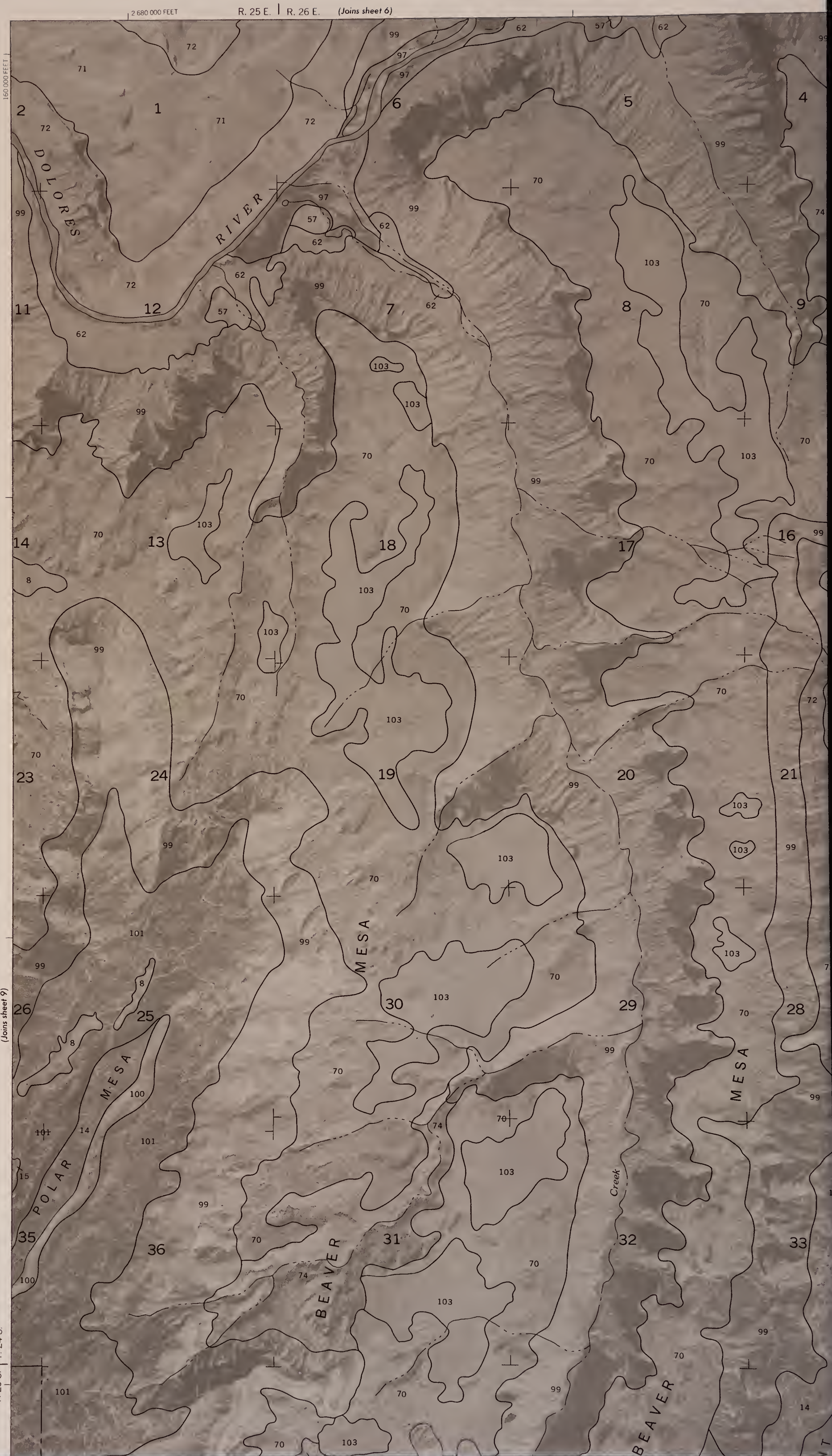
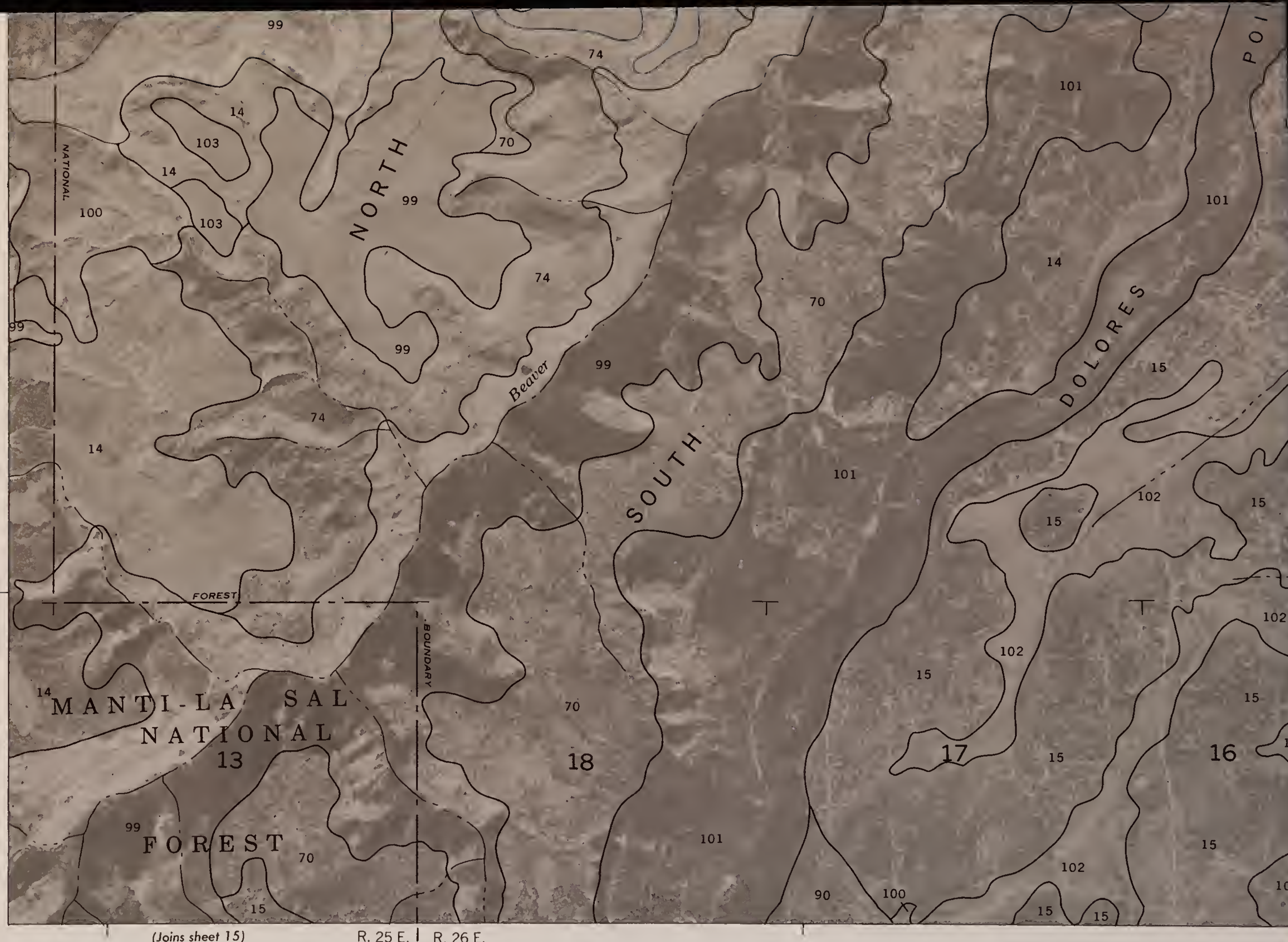
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



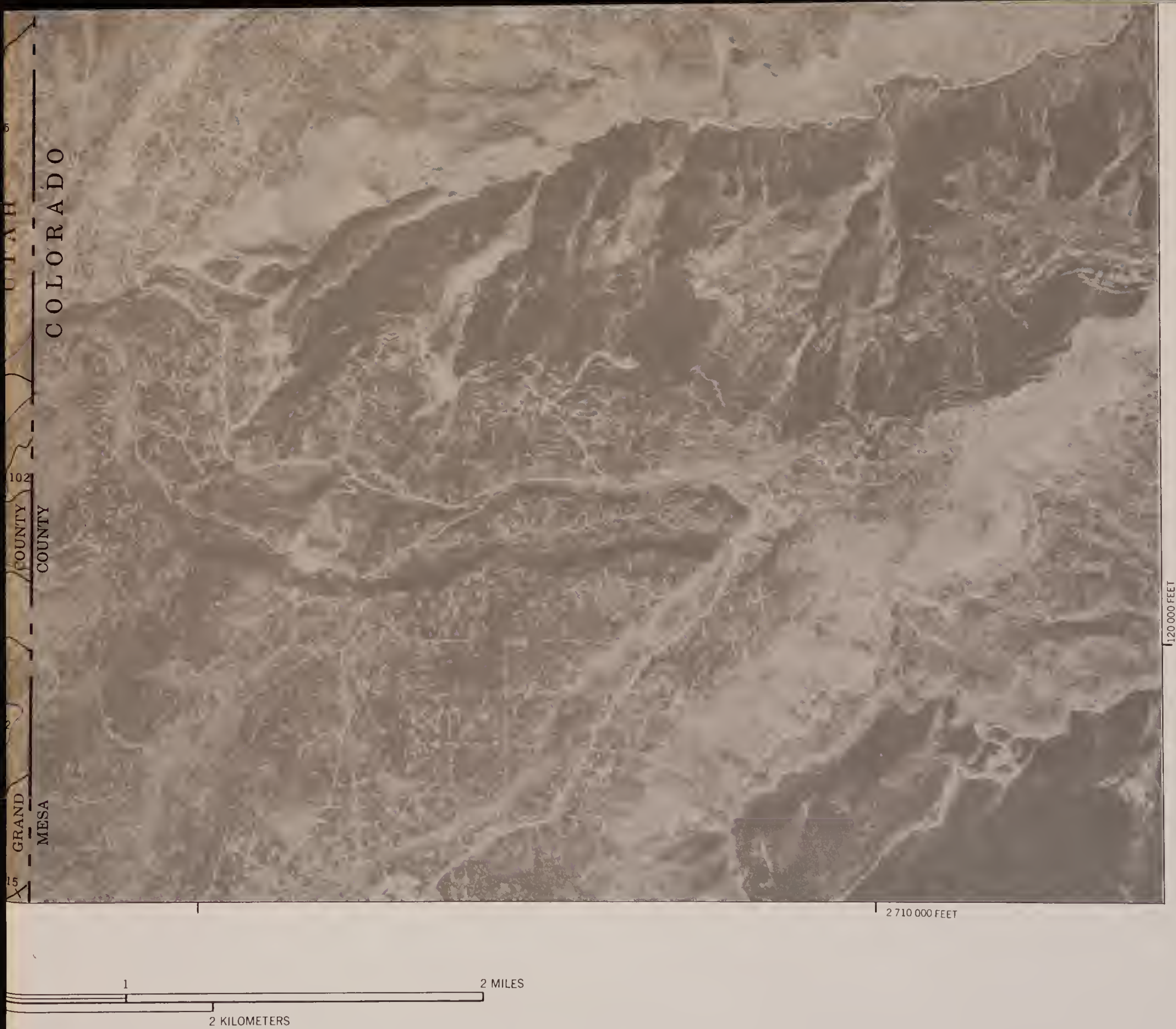
SHEET NO. 10

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

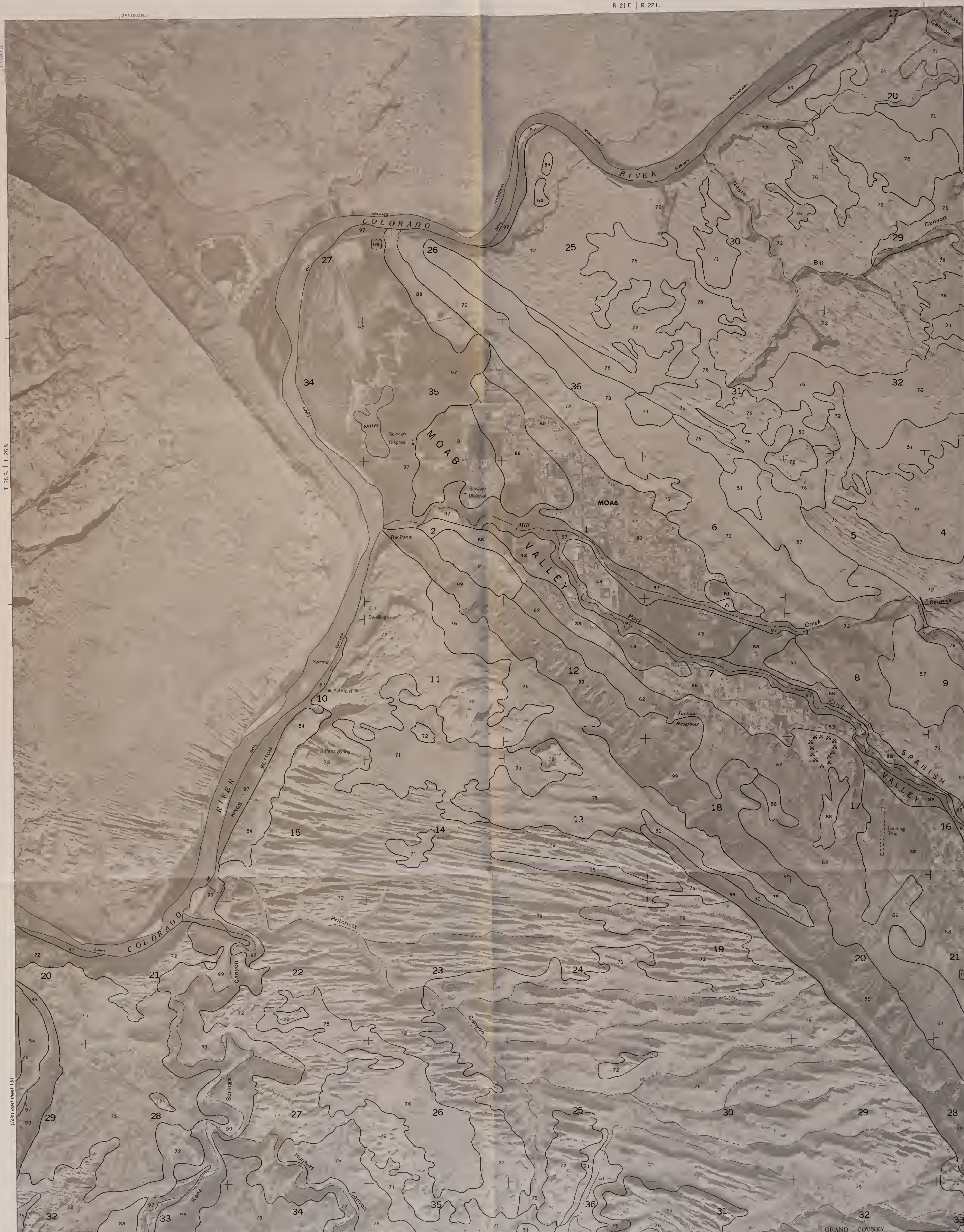
CANYONLANDS AREA, UTAH, PARTS OF GRAND



AND SAN JUAN COUNTIES NO. 10

SHEET NO.10 OF 57

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

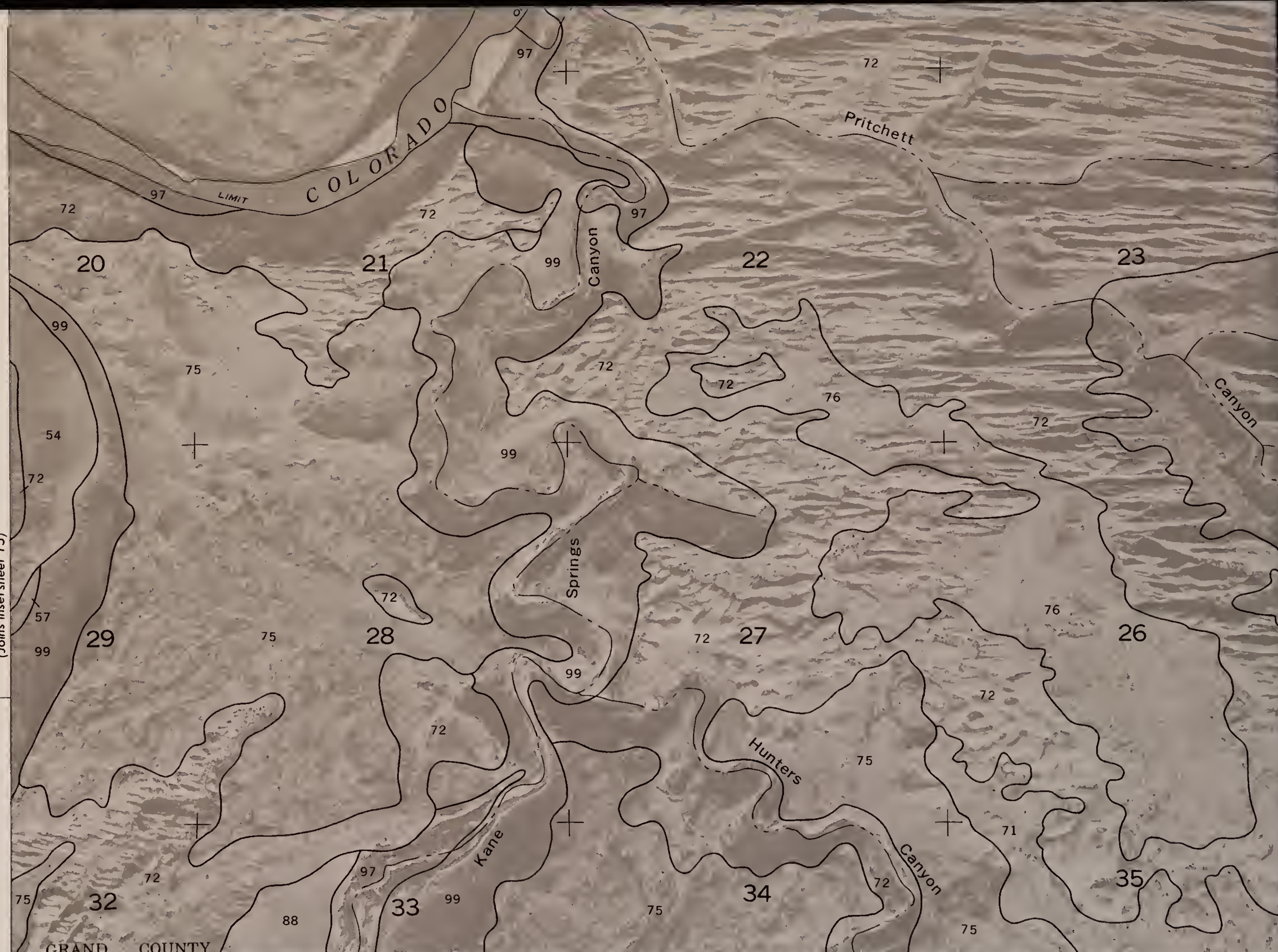
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

#24363150 ID: 88071562

S 599 .U8 C36 1991

SHEET NO. 11
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

R. 21 E. | R. 22 E.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

CANYONLANDS AREA, UTAH, PARTS OF

1 2 MILES

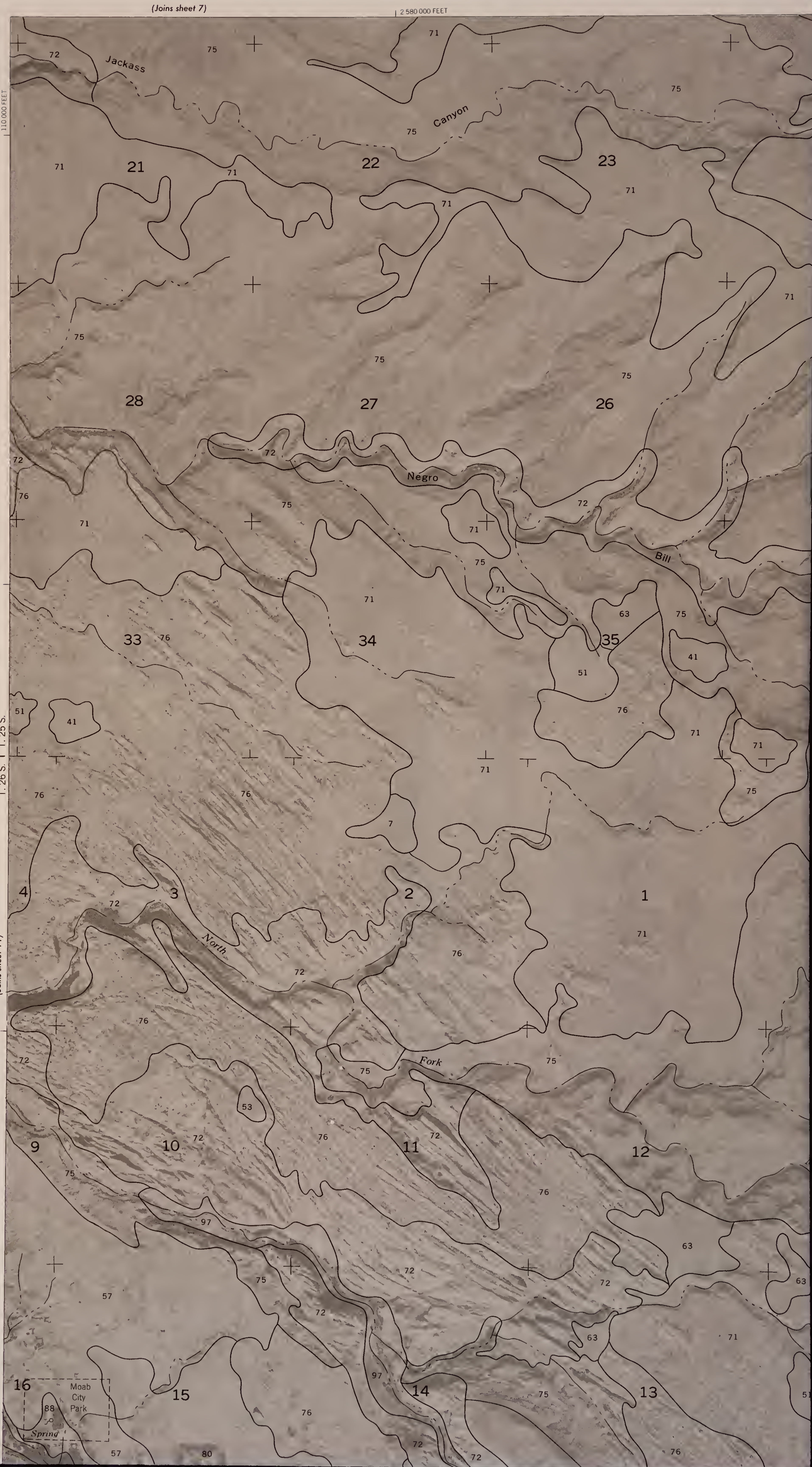
1 2 KILOMETERS

24 000

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

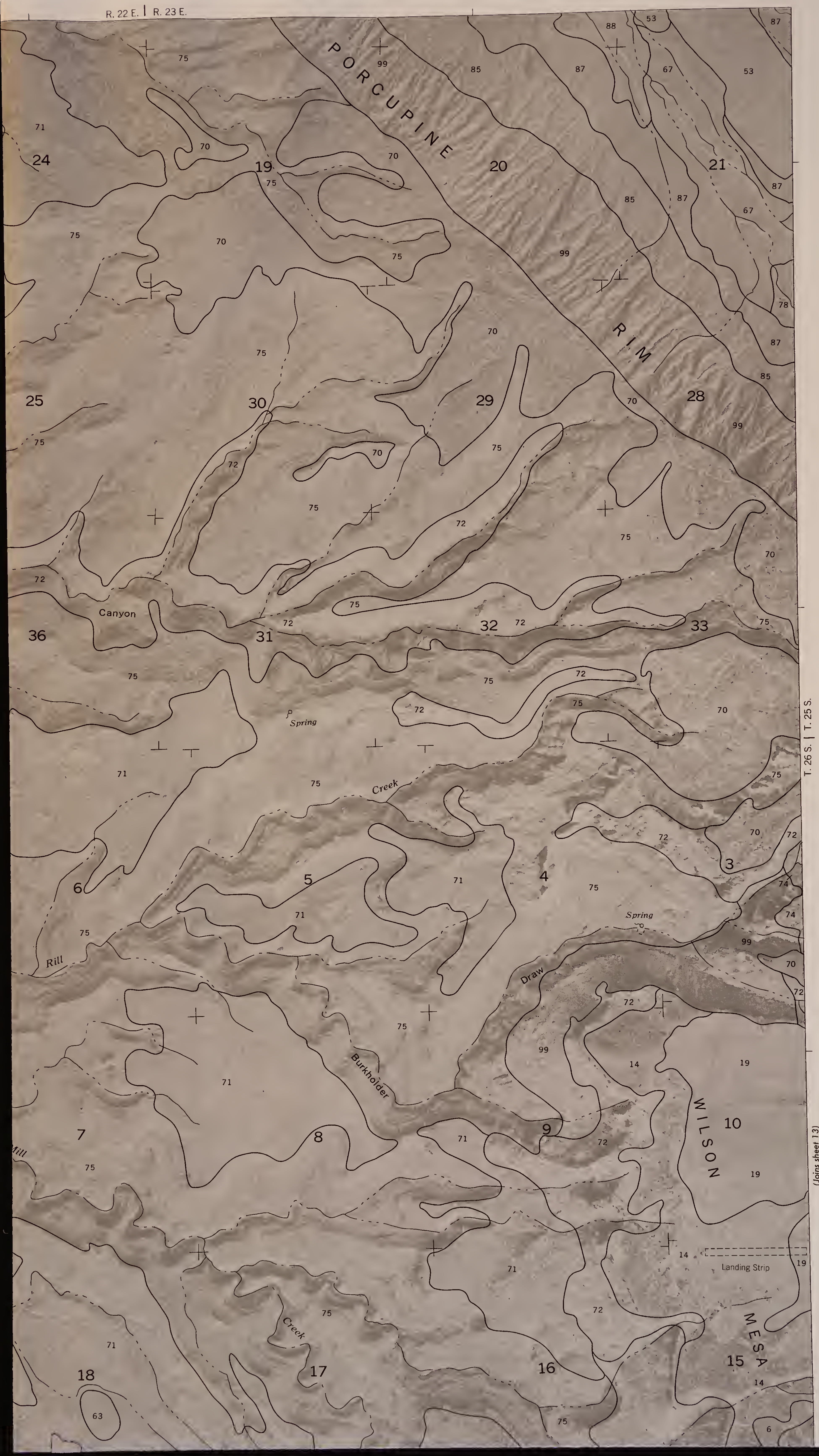
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

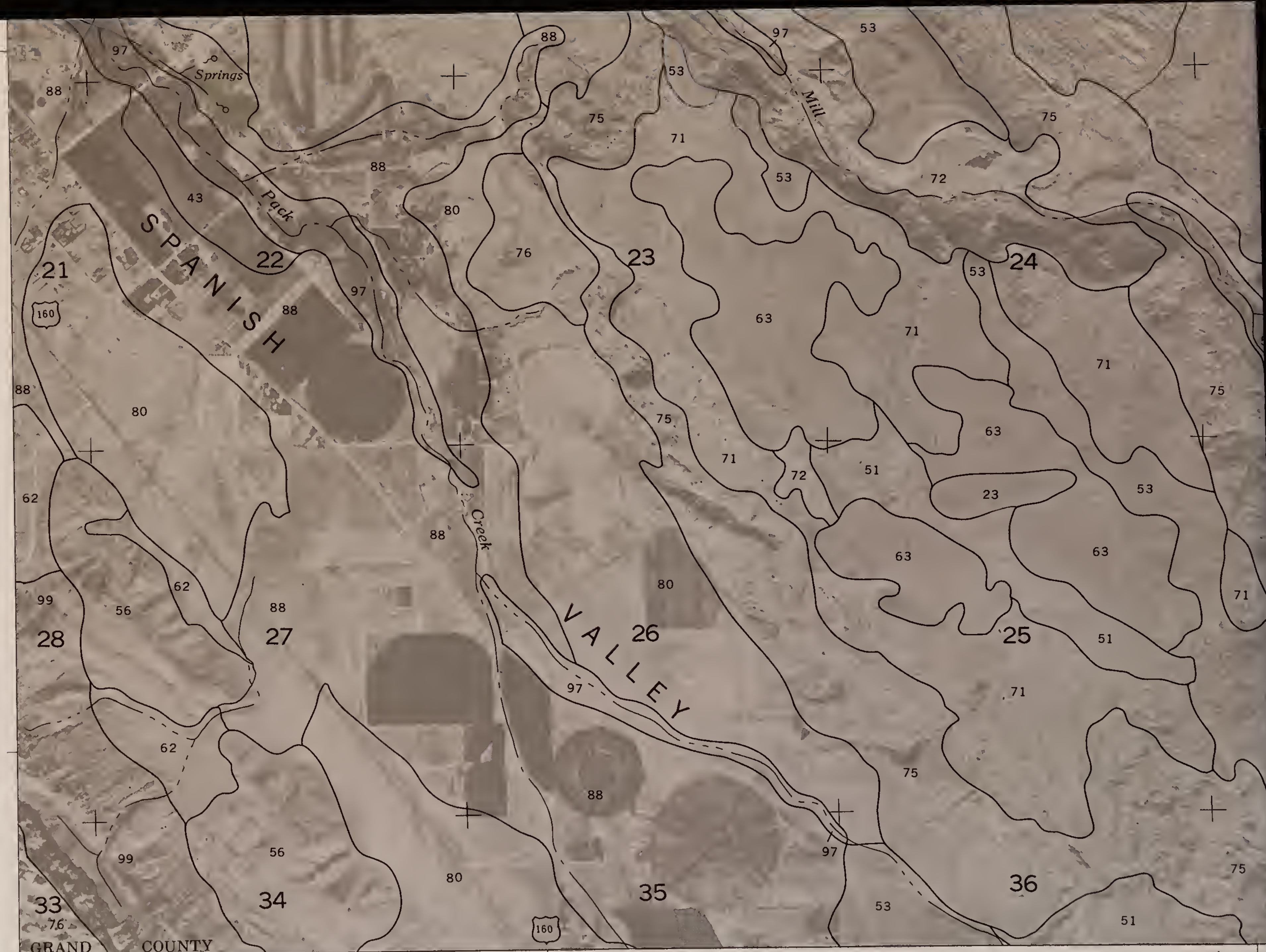
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 12

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





SAN JUAN COUNTY

(Joins sheet 20)

R. 22 E. | R. 23 E

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

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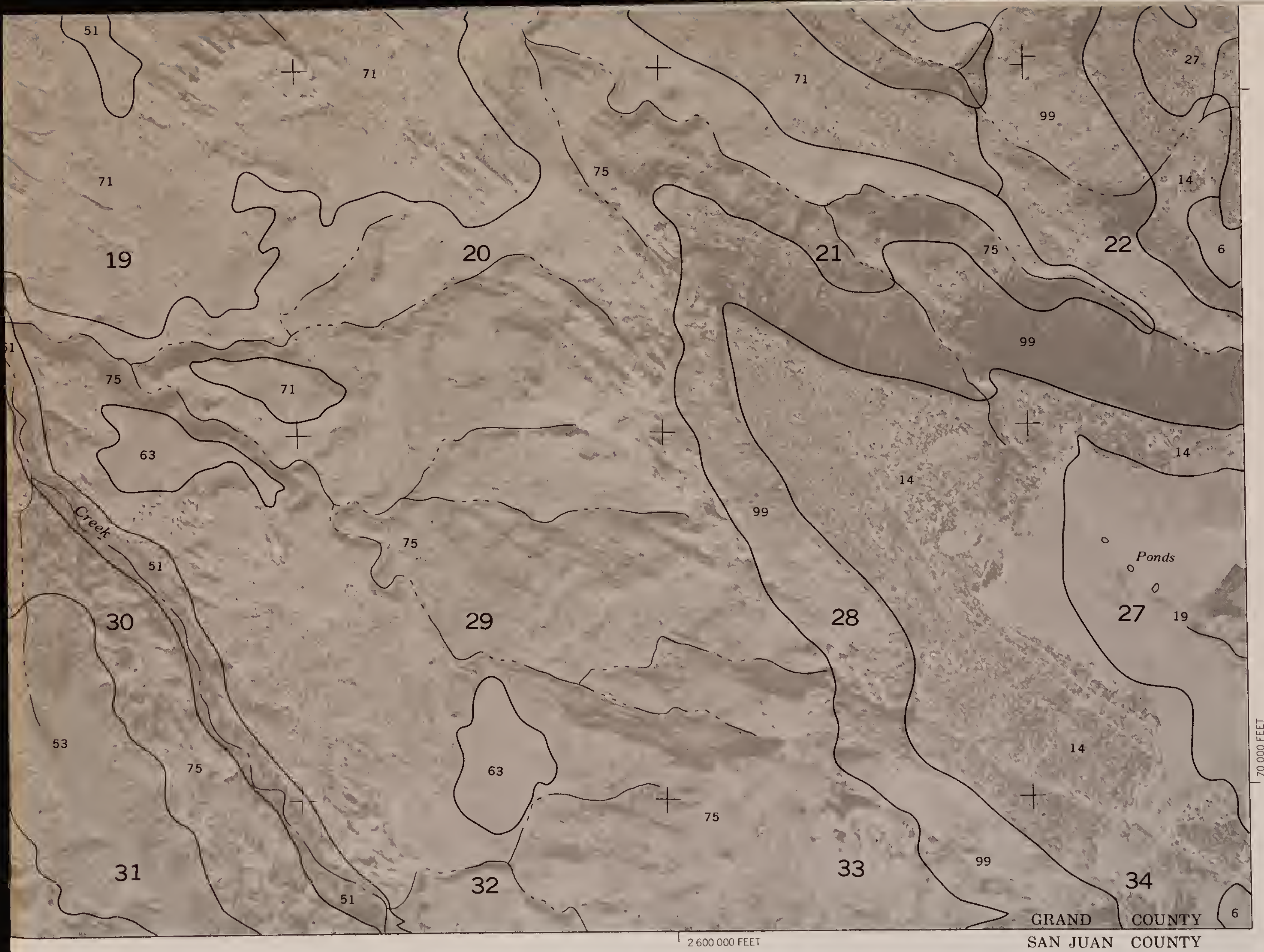


1
2 MILES
1
2 KILOMETERS
4 000

GRAND AND SAN JUAN COUNTIES NO. 12

SHEET NO. 12 OF 57

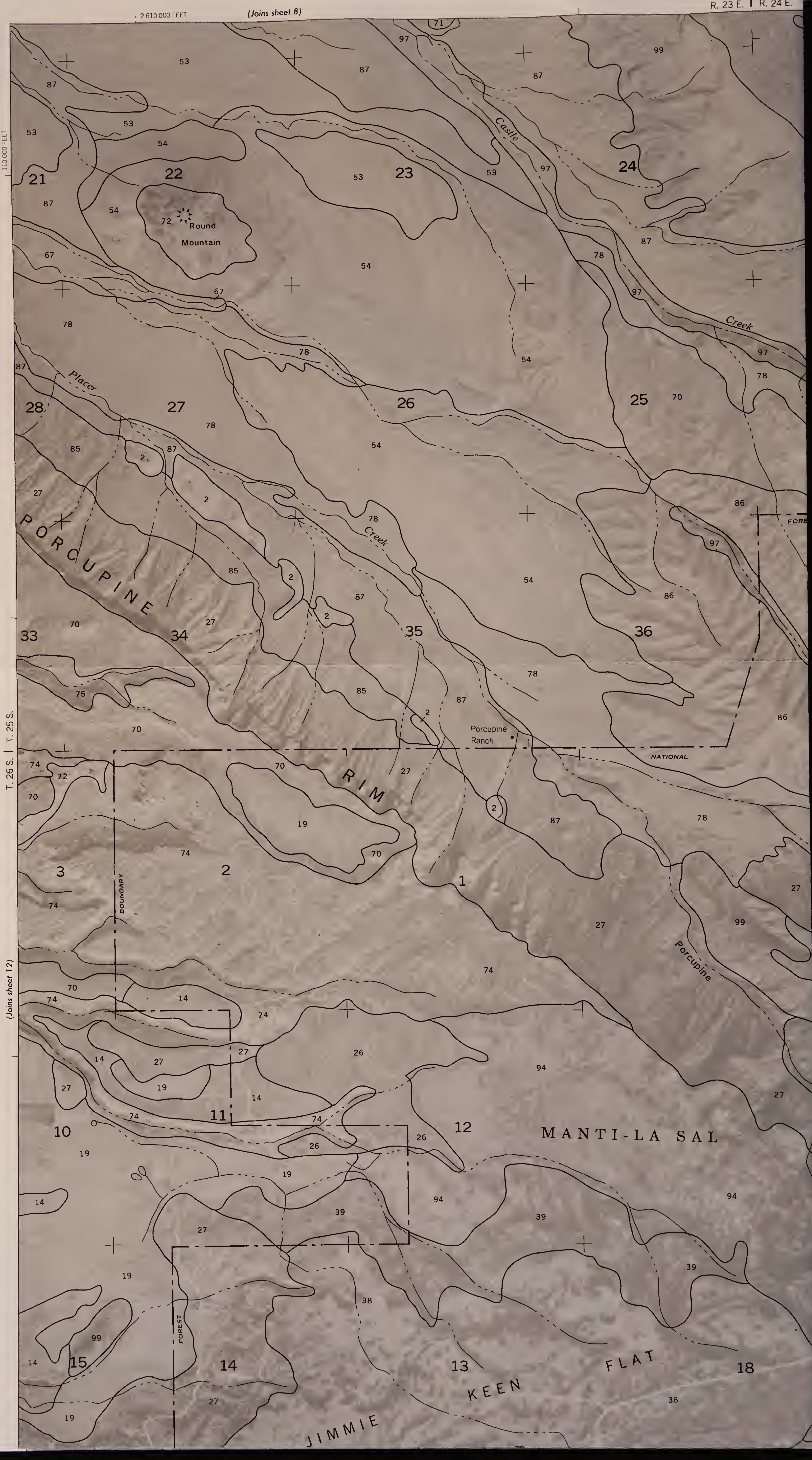
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

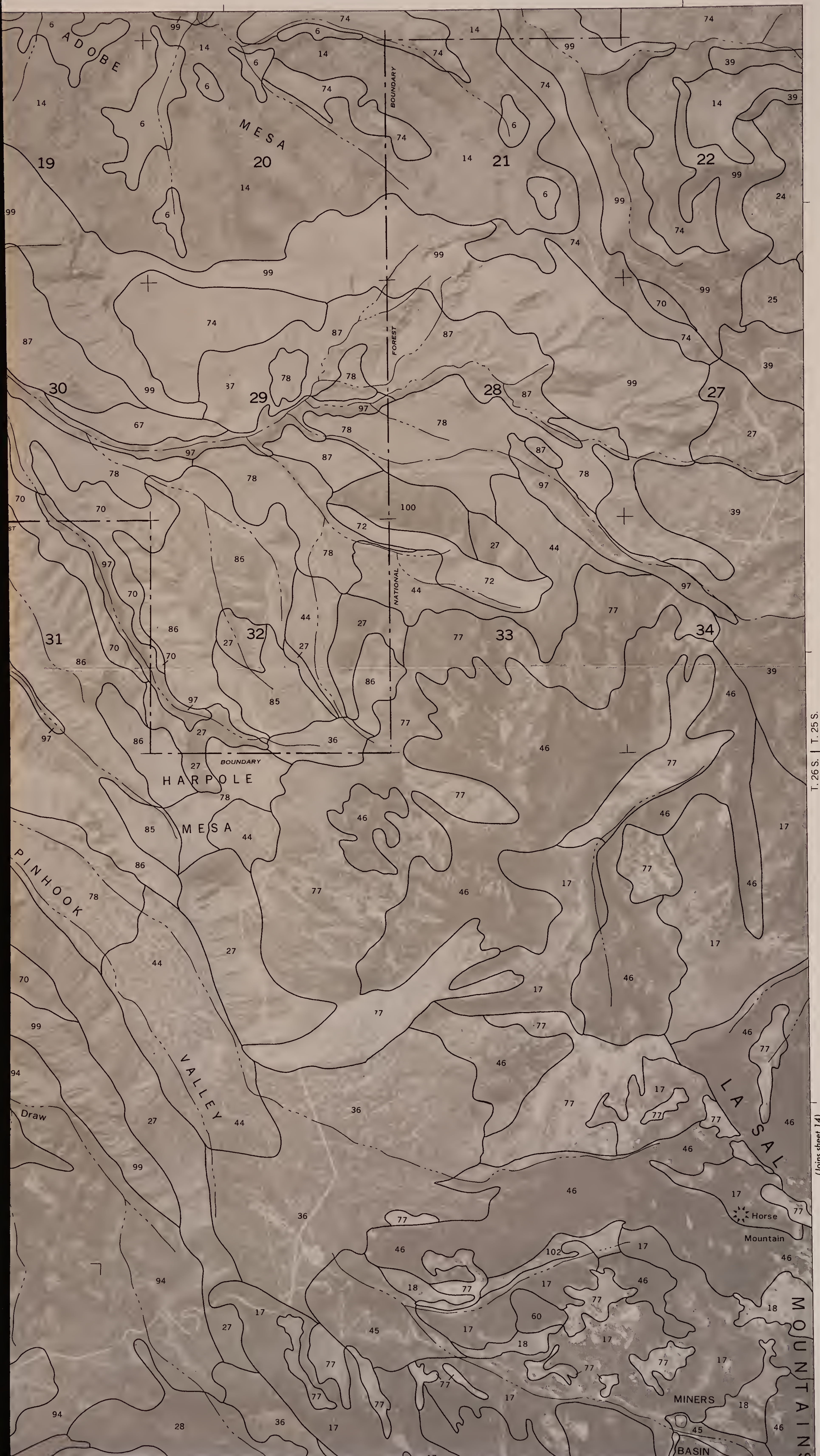
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 13
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



1 3/4 1/2 1/4 0
1 0.5 0
SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 2 MILES

1 2 KILOMETERS

4 000

RAND AND SAN JUAN COUNTIES NO. 13

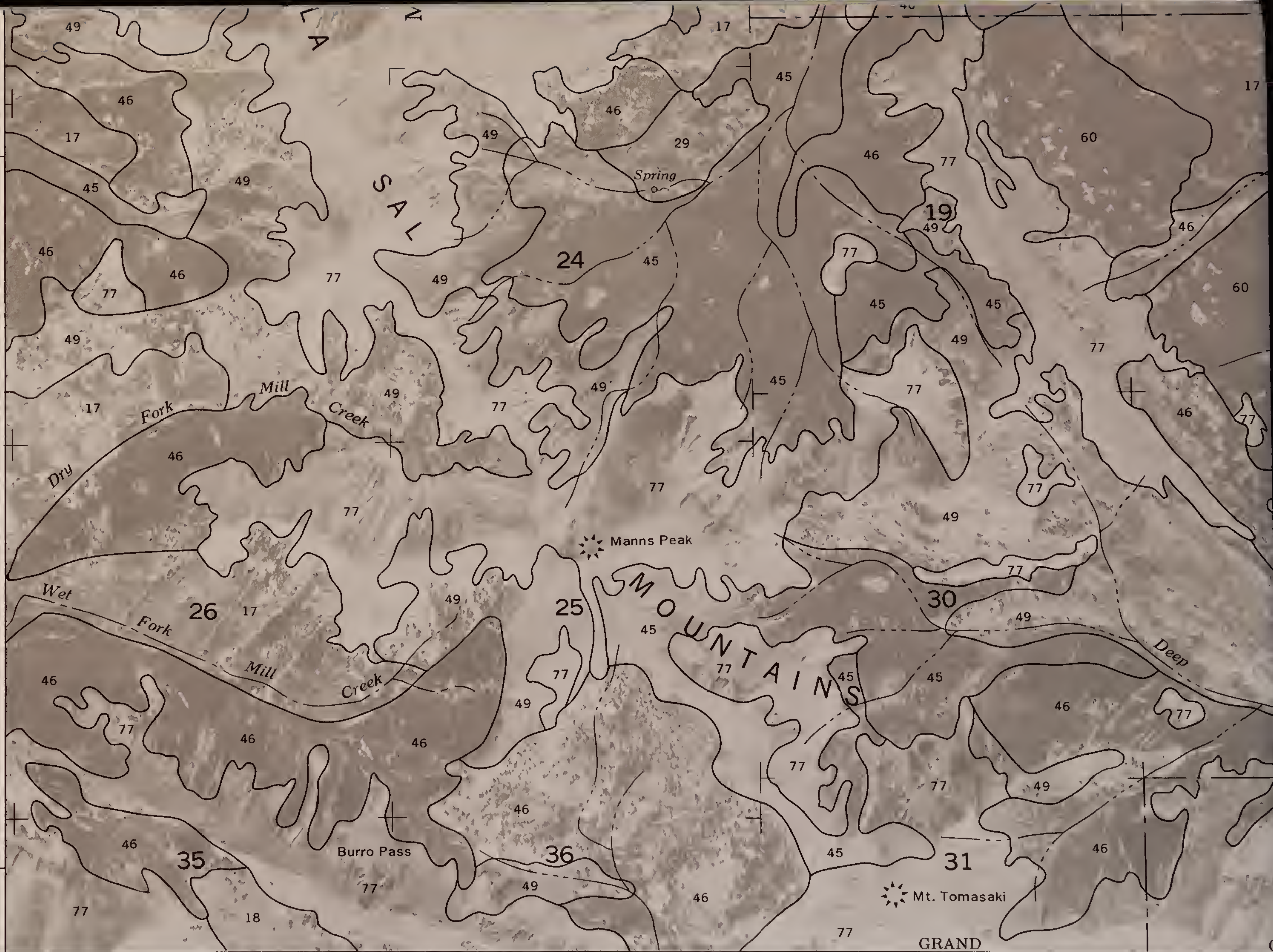
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 14

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



(Joins sheet 22)

R. 24 E. | R. 25 E.

SAN JUAN

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

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1 2 MILES

1 2 KILOMETERS

24 000

GRAND AND SAN JUAN COUNTIES NO. 14

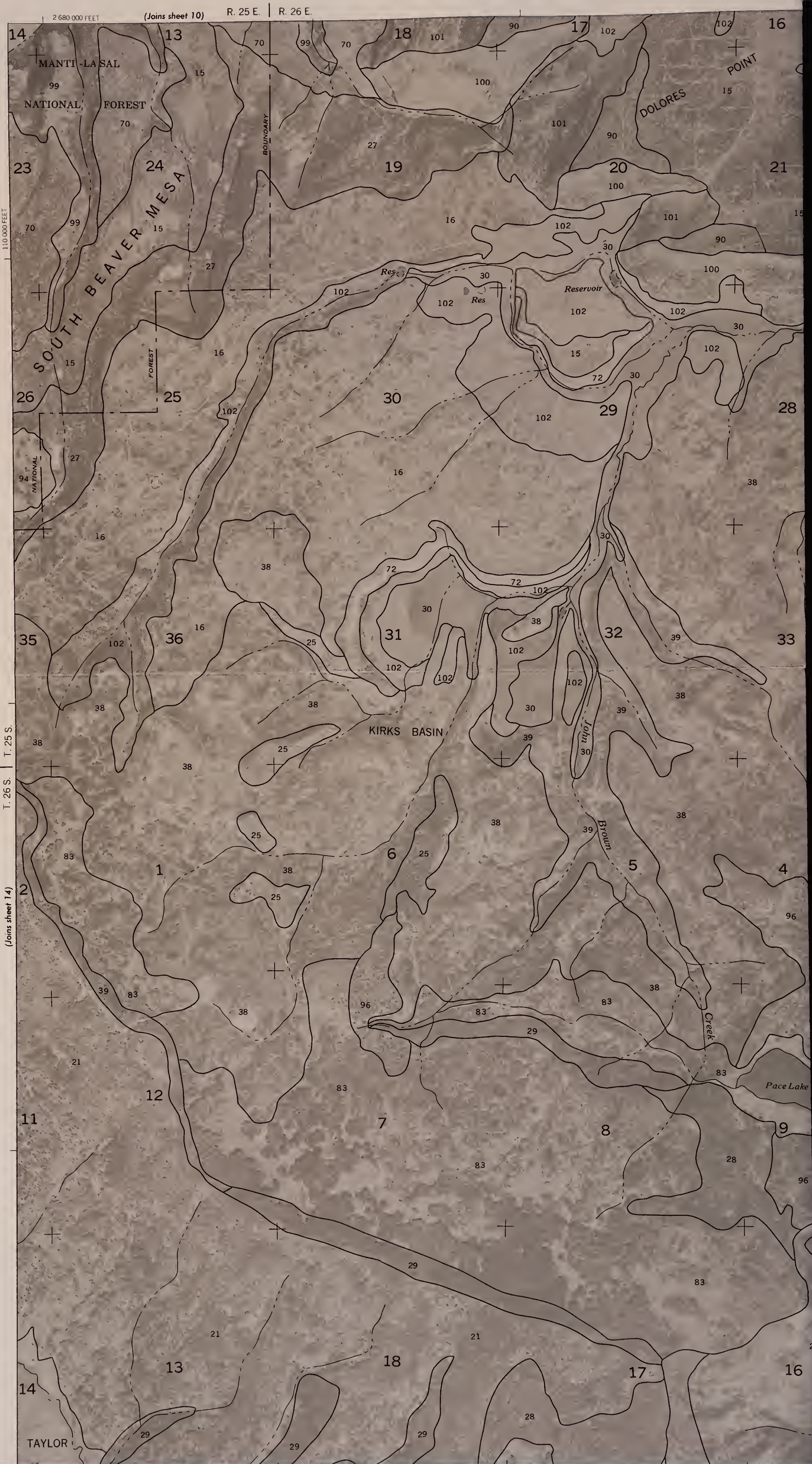
SHEET NO. 14 OF 57

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

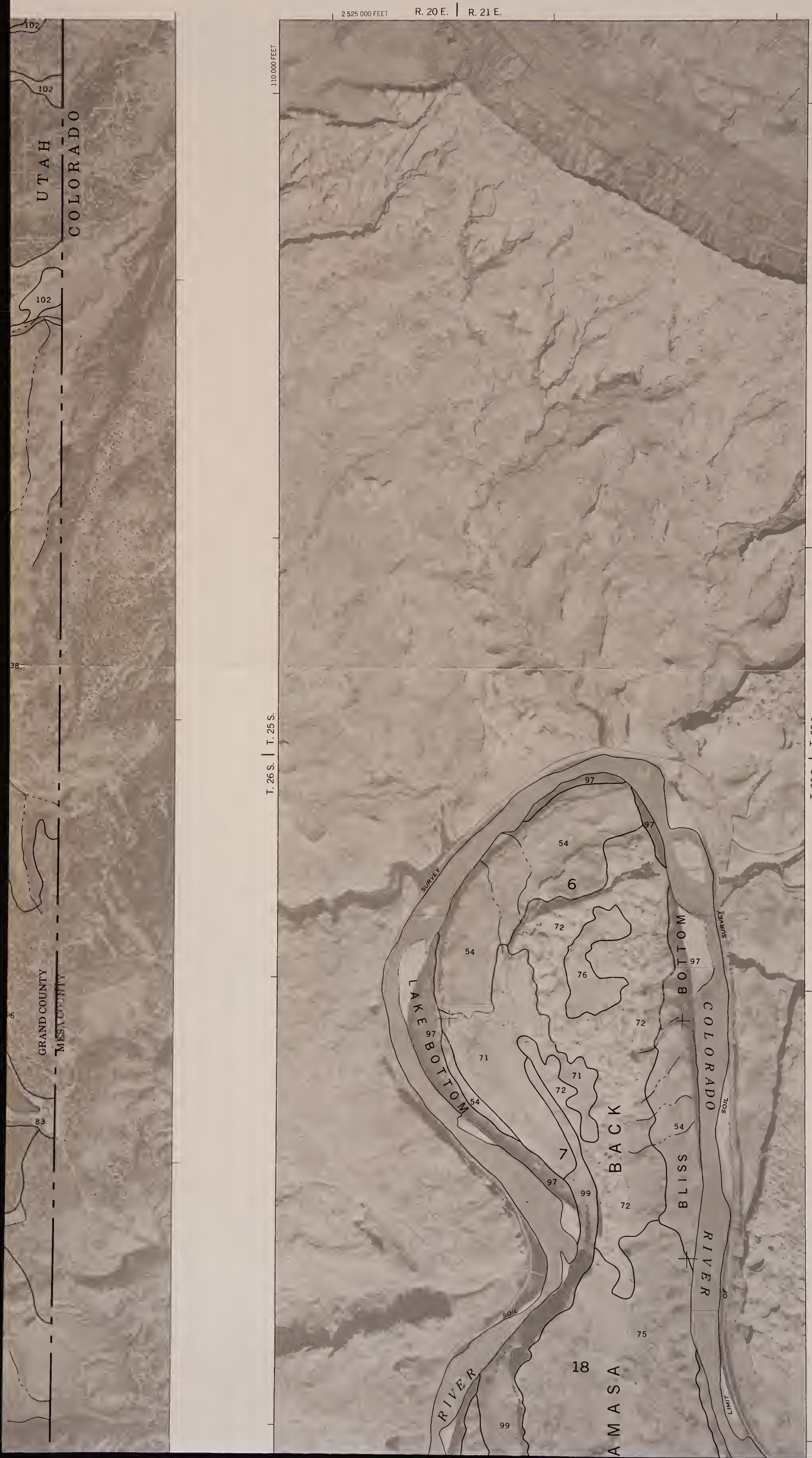
SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 15
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

1 2 MILES

1 2 KILOMETERS

24 000

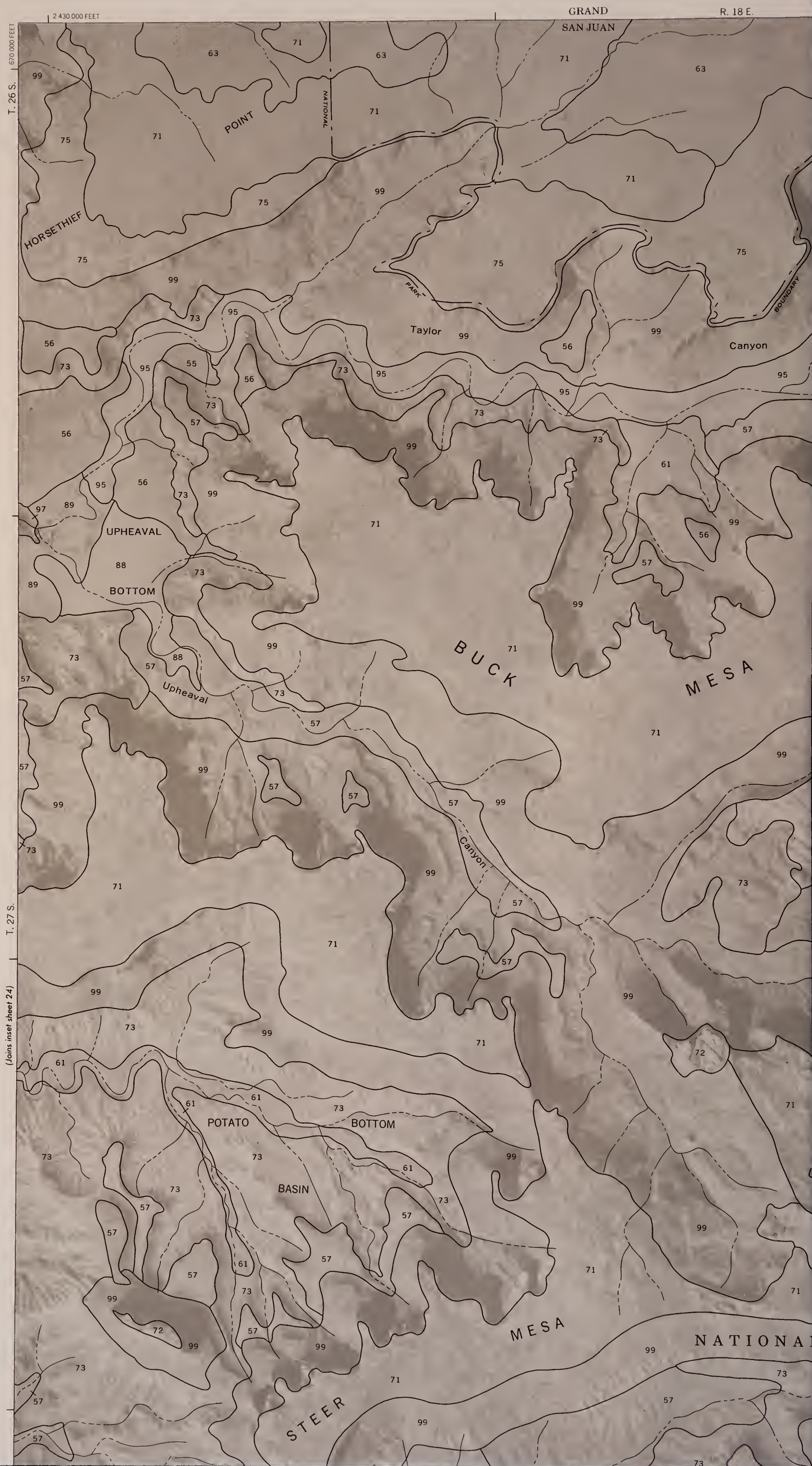
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

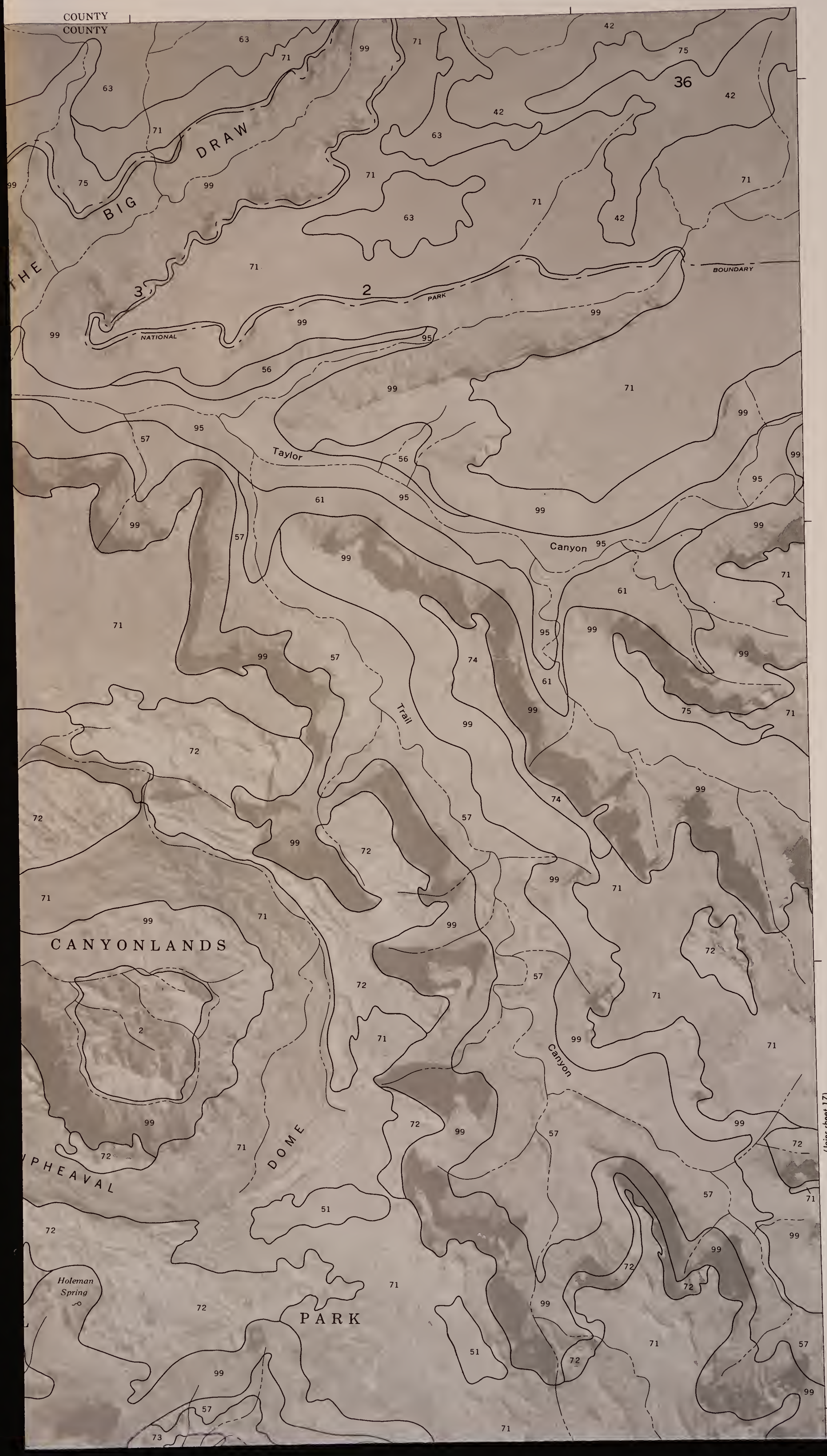
SCALE 1:24 000

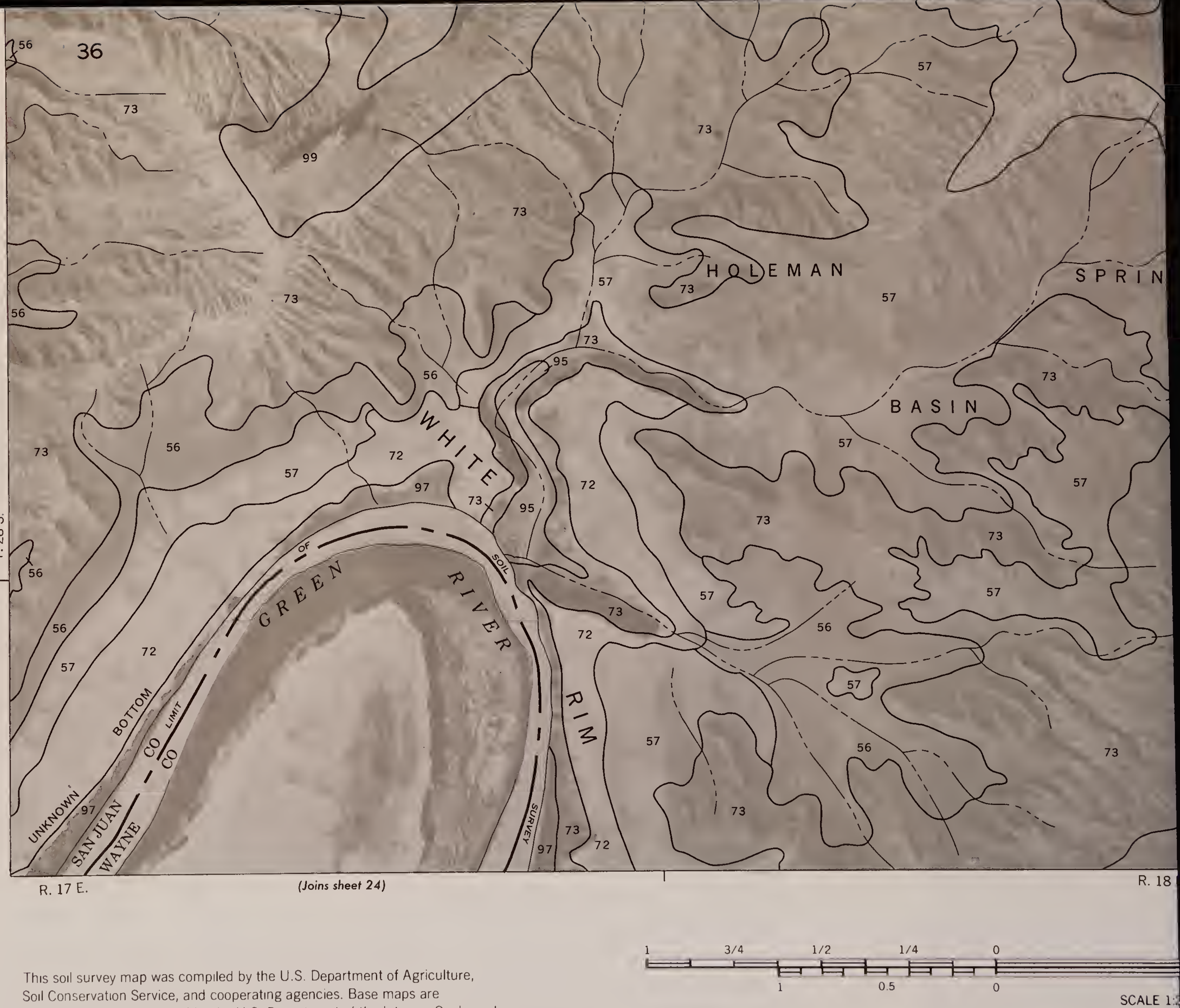
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





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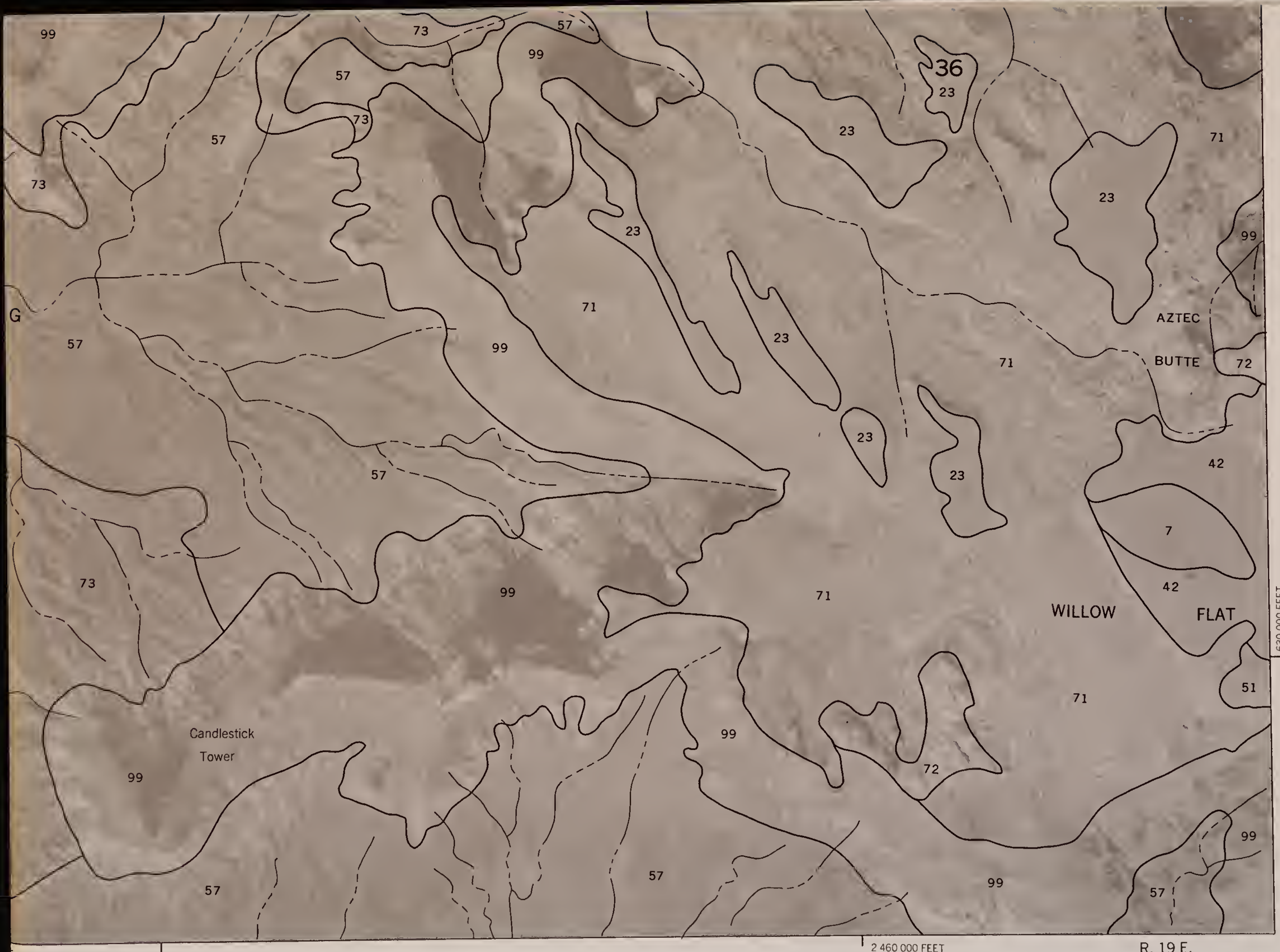


1
2 MILES
1
2 KILOMETERS
4 000

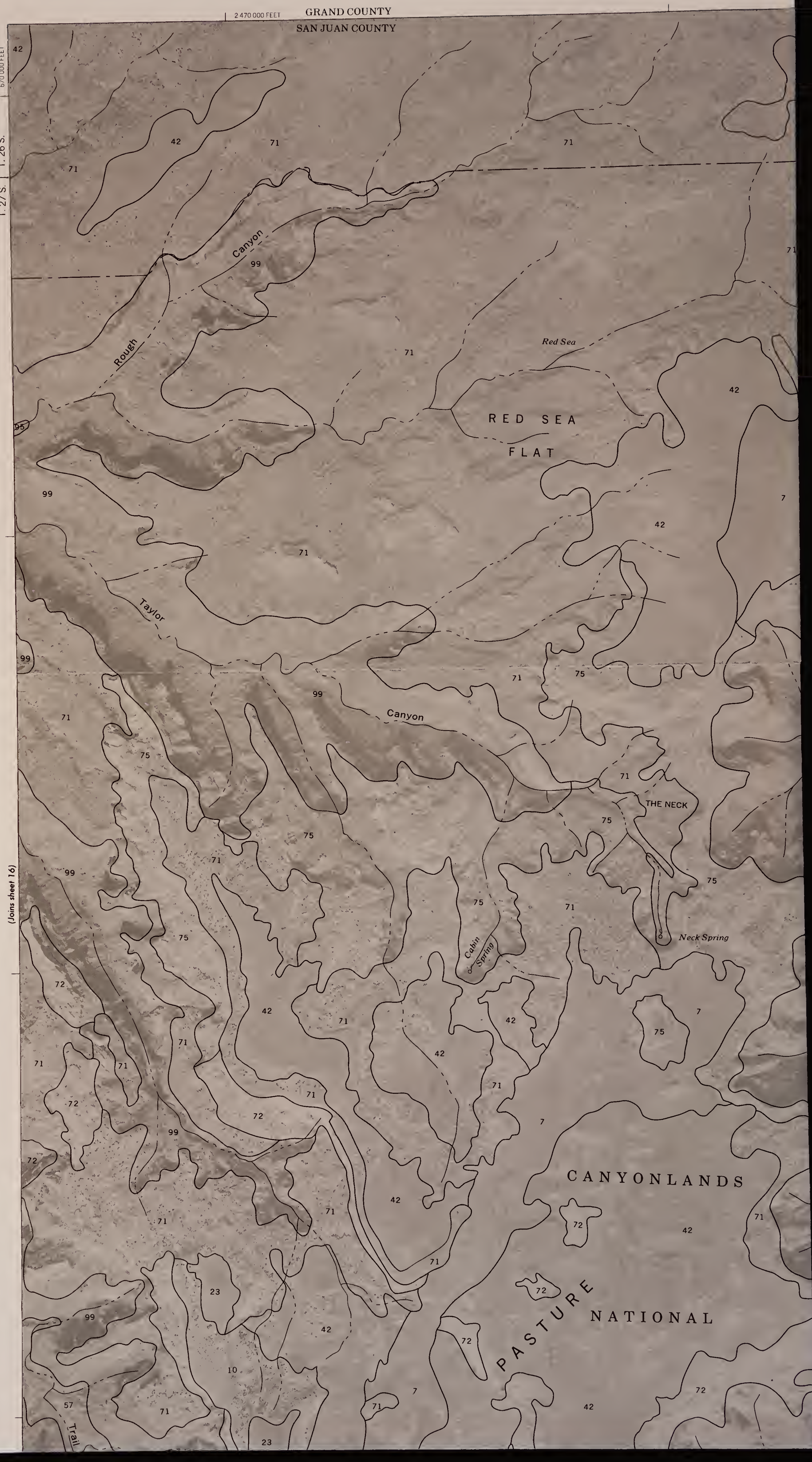
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

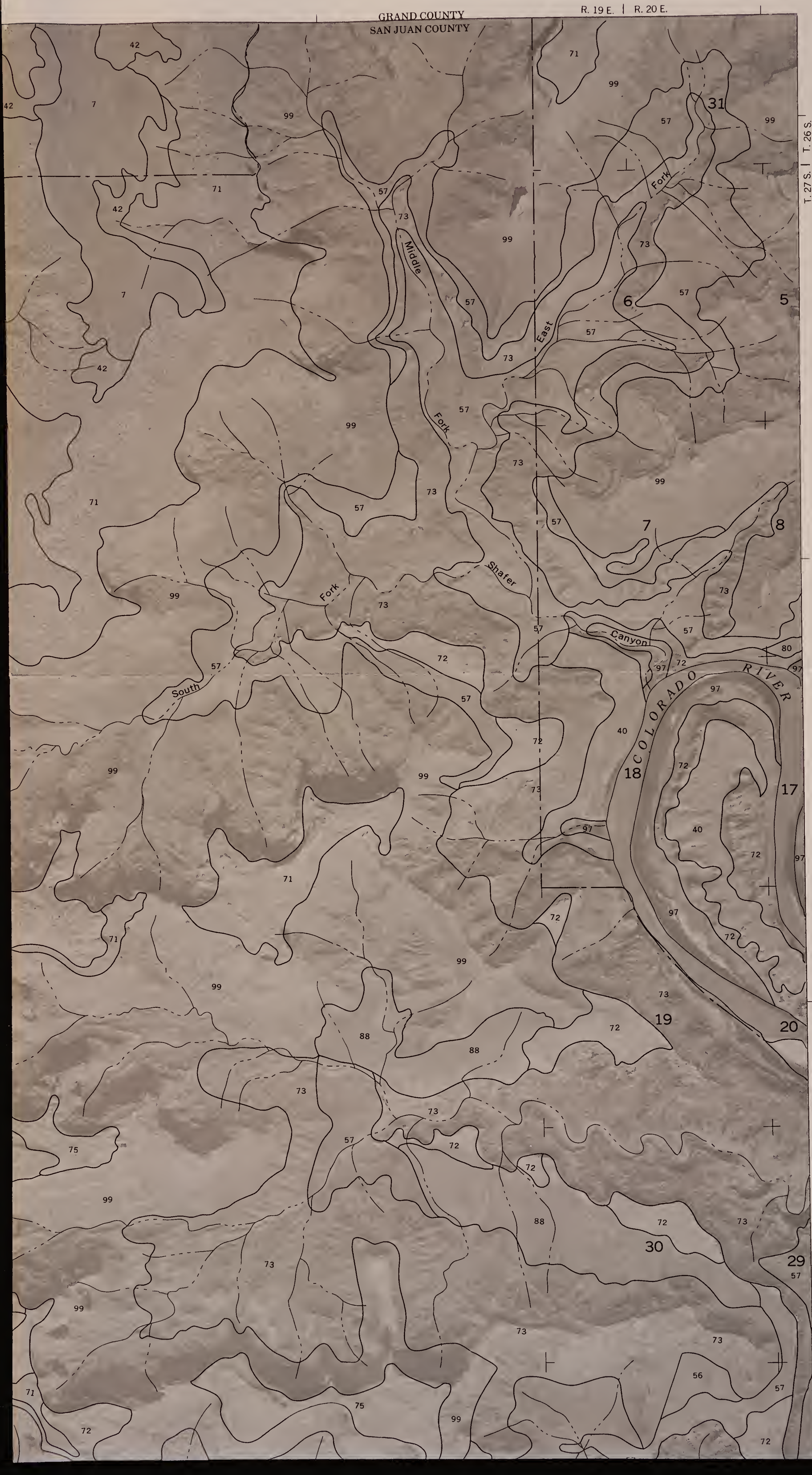
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

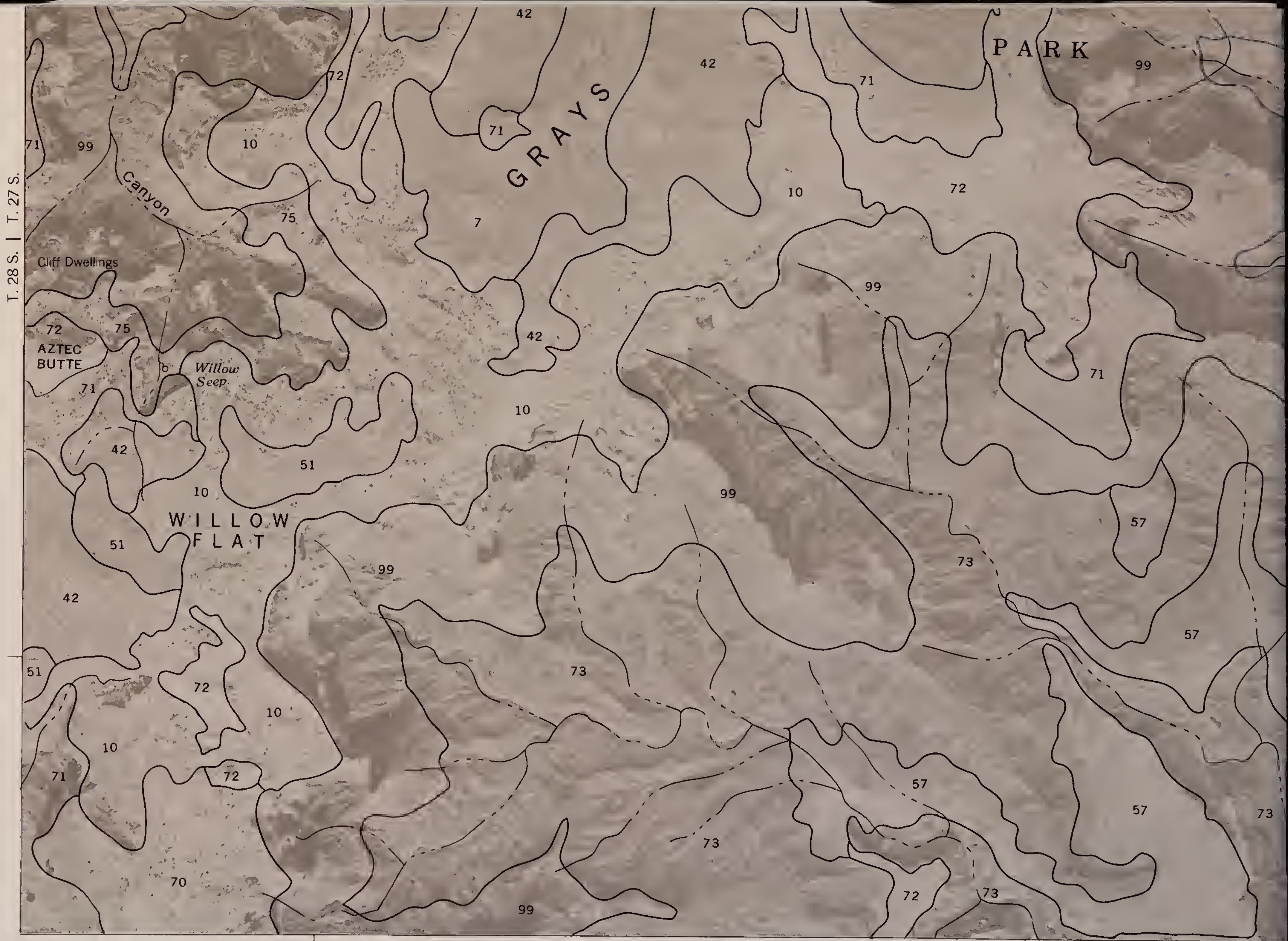
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 17
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





(Joins sheet 25)

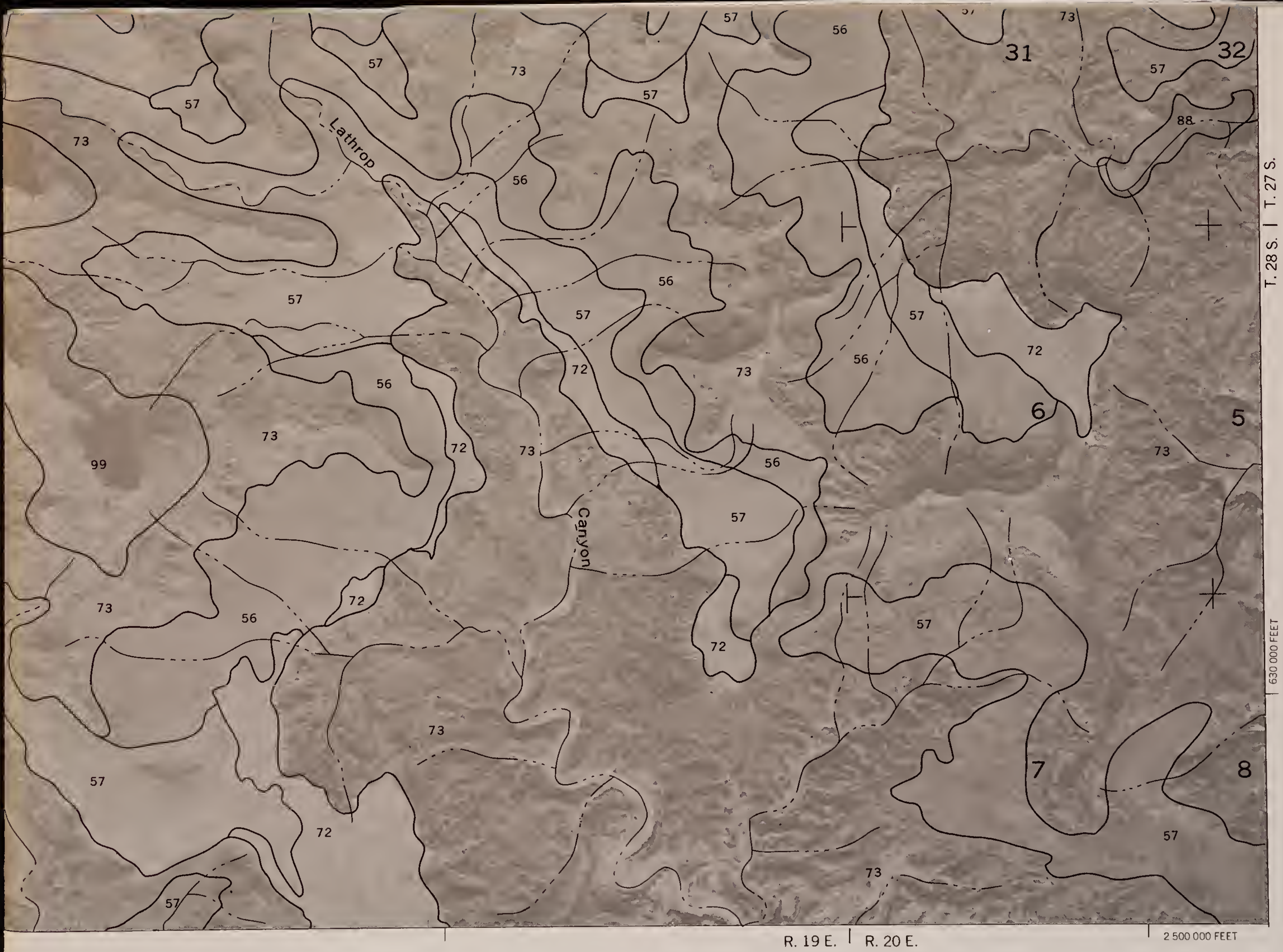
1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS OF



1 2 MILES

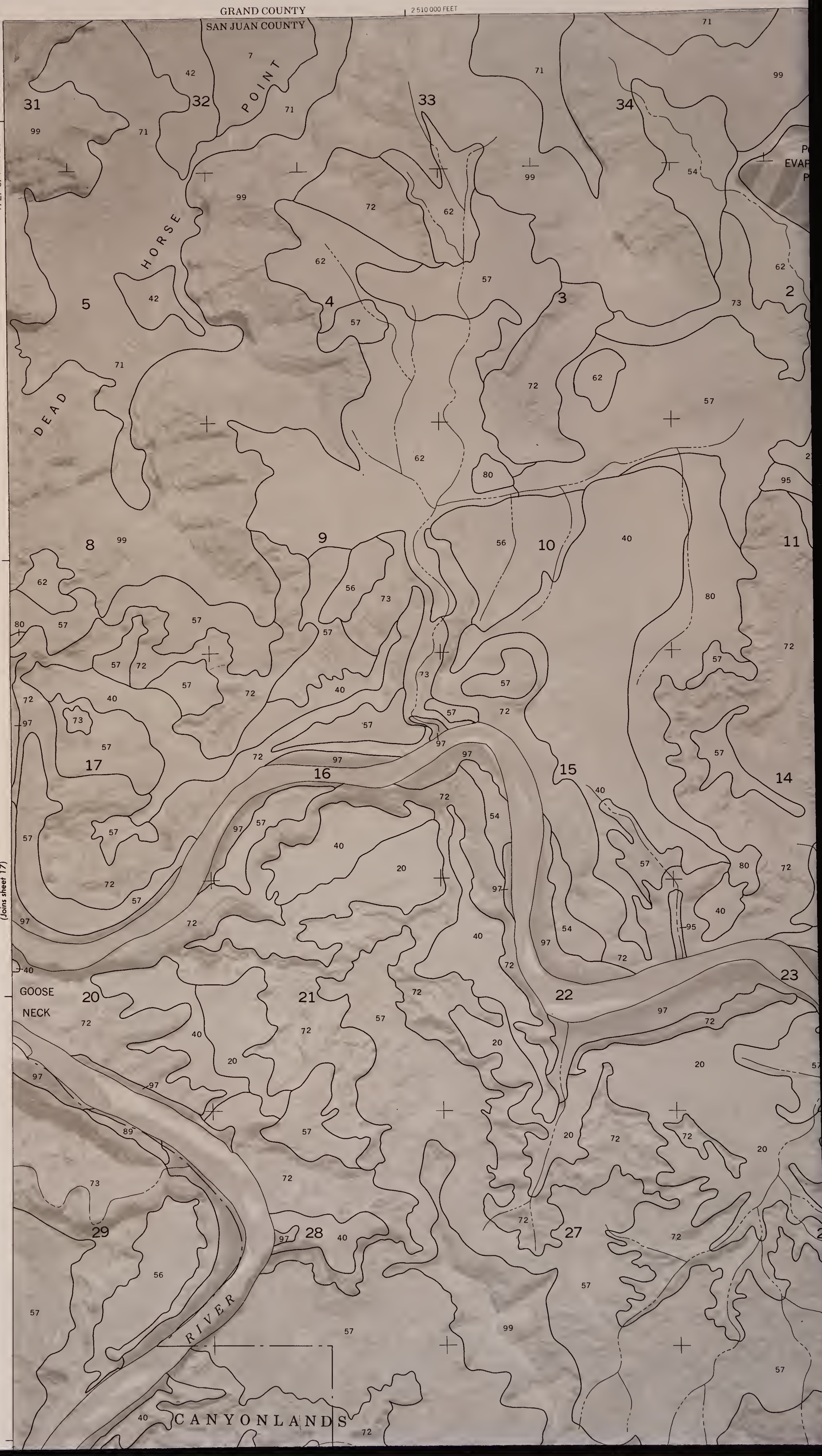
1 2 KILOMETERS

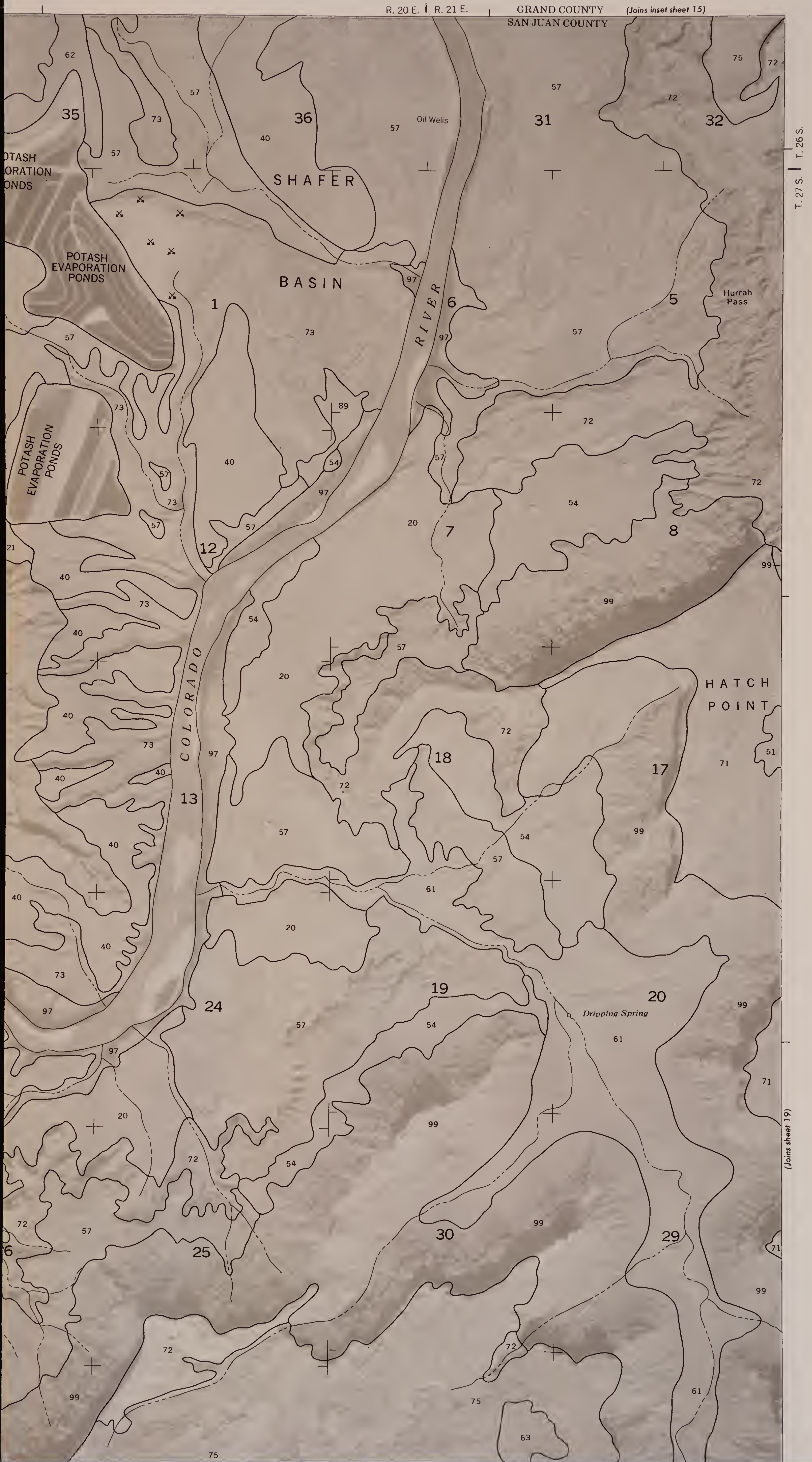
24 000

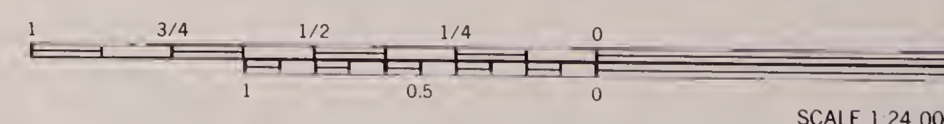
SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

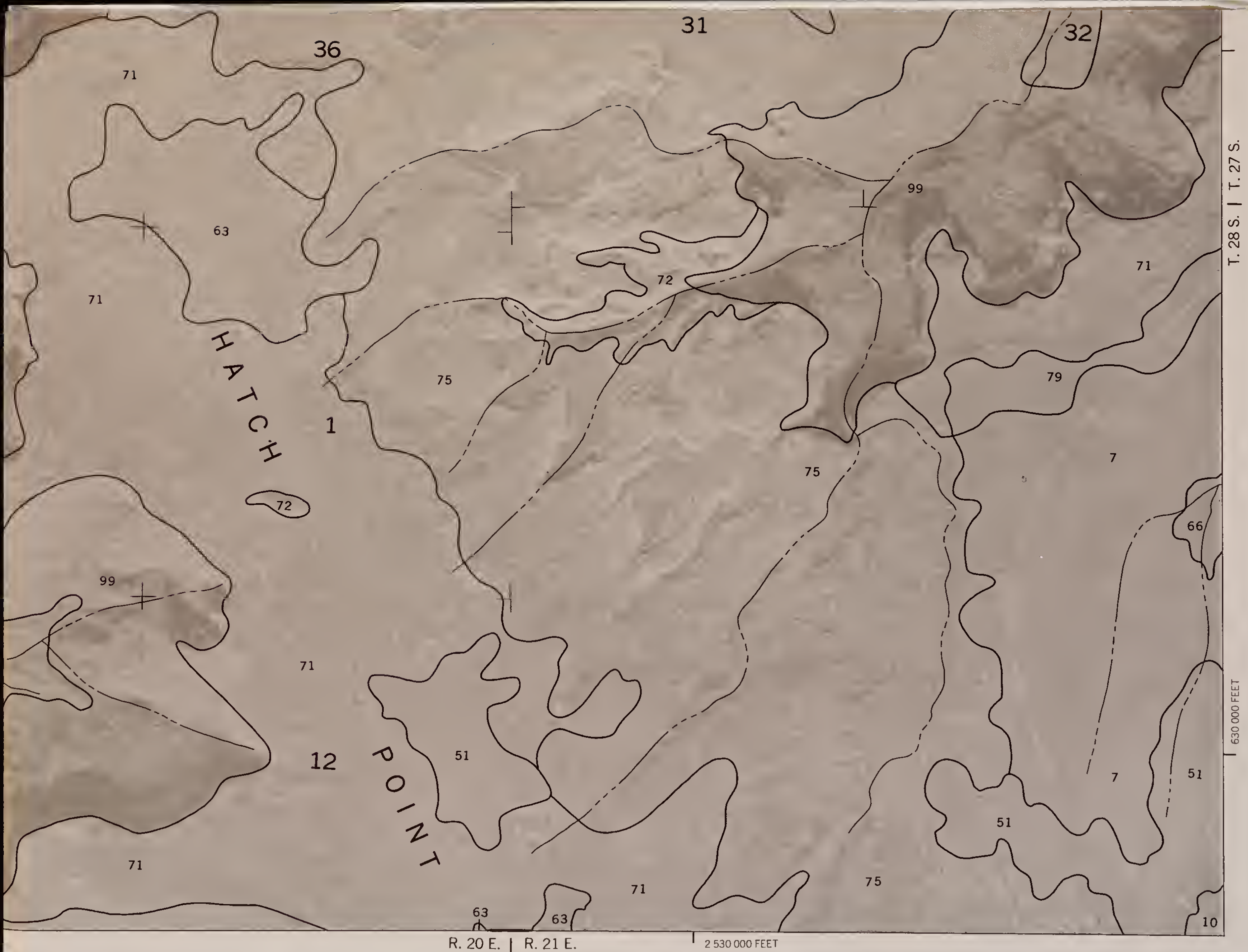
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE




R. 20 E. | R. 21 E.
GRAND COUNTY
SAN JUAN COUNTY
(Joins inset sheet 15)
T. 26 S.
T. 27 S.
(Joins sheet 19)
POTASH EVAPORATION PONDS
SHAFER BASIN
Oil Wells
COLORADO RIVER
Hurrah Pass
HATCH POINT
Dripping Spring



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



ND AND SAN JUAN COUNTIES NO. 18

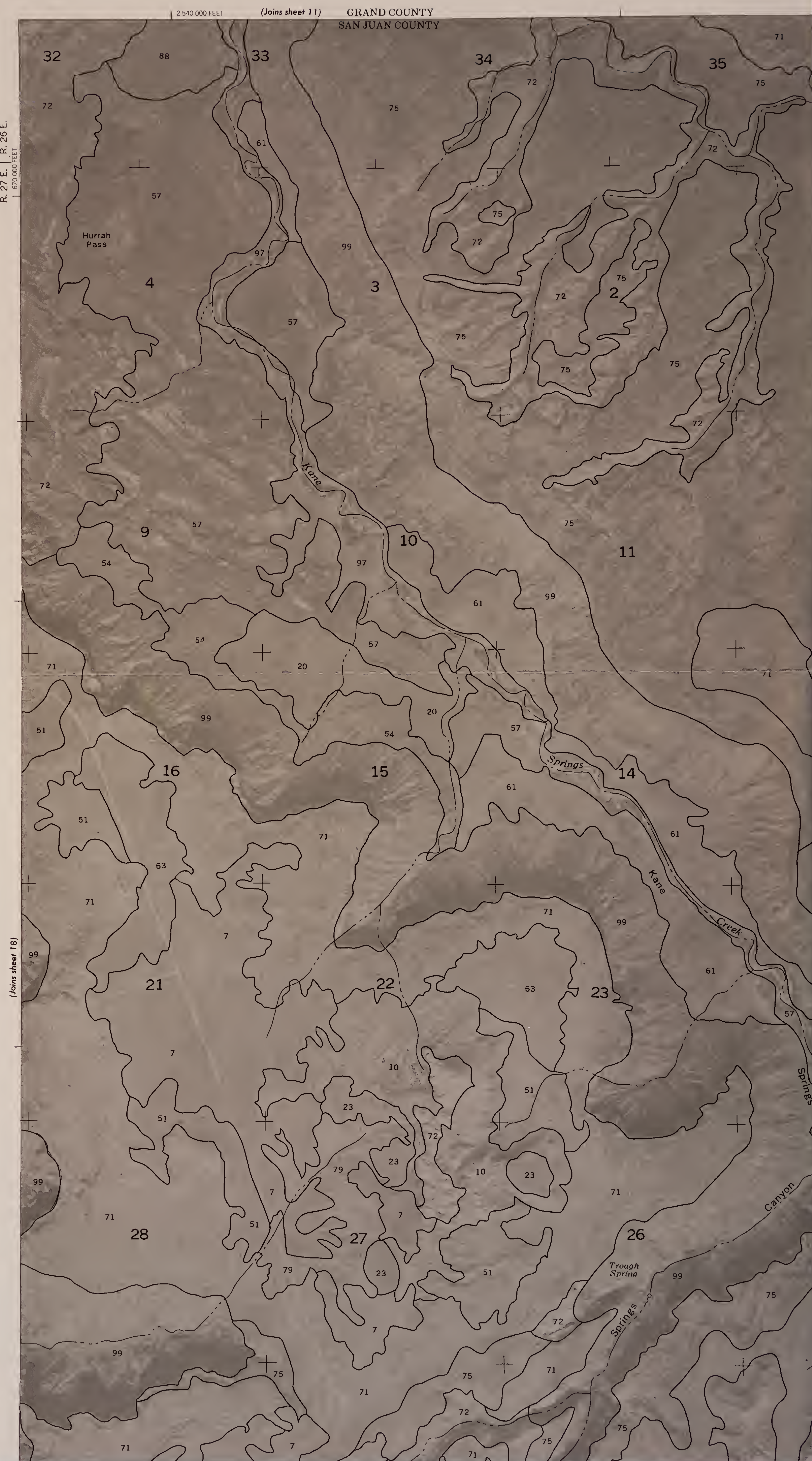
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 19
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

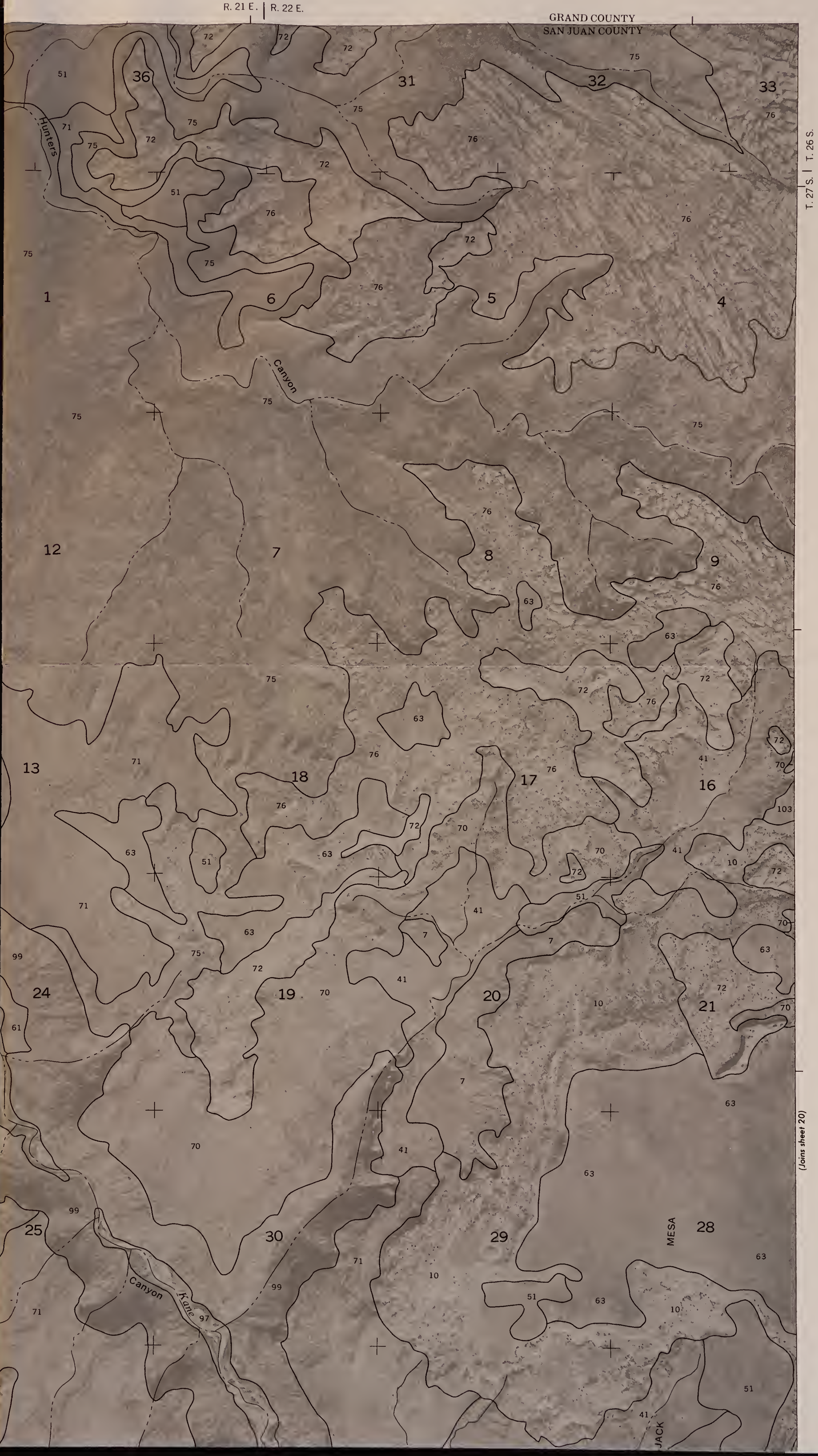
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

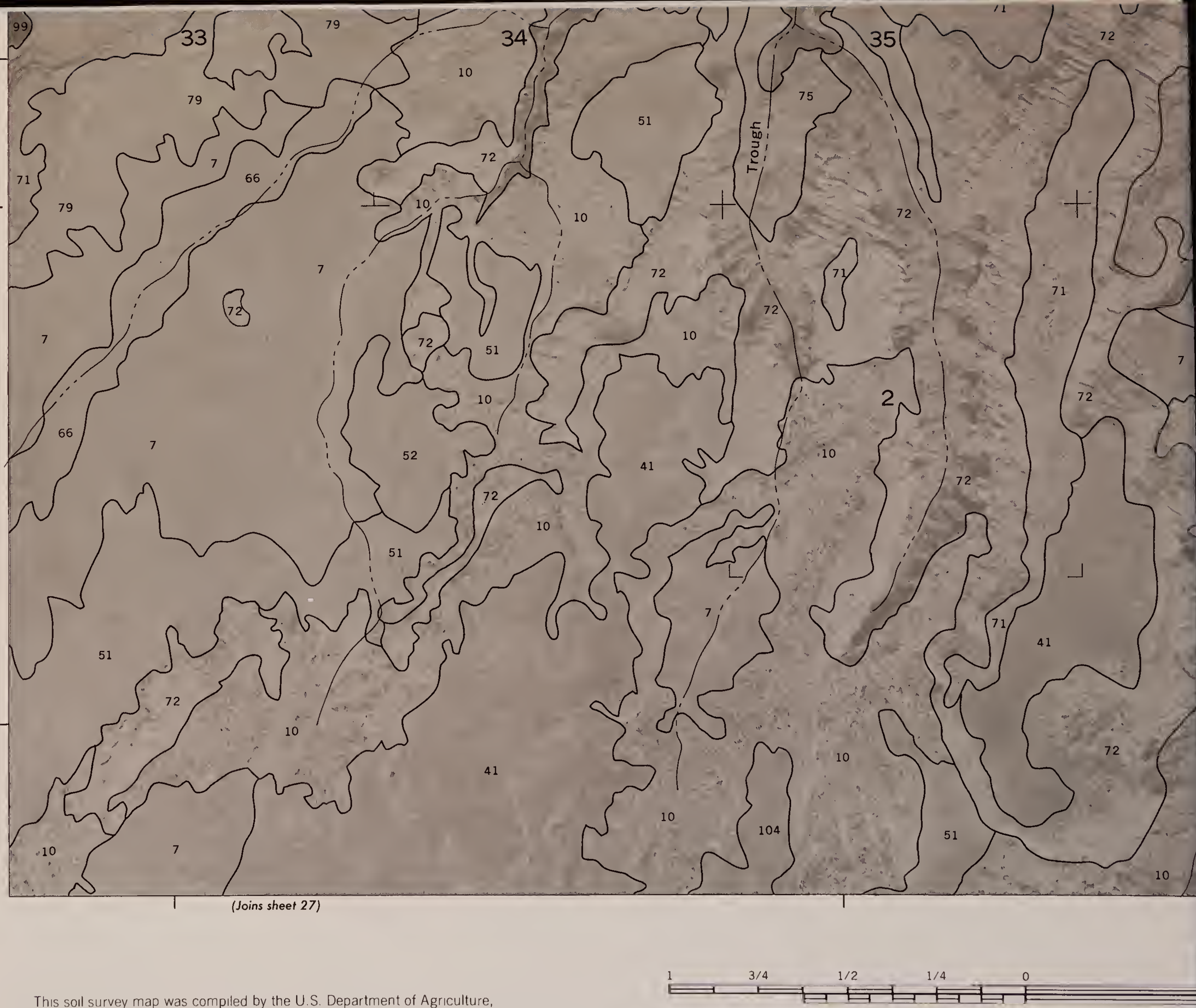
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

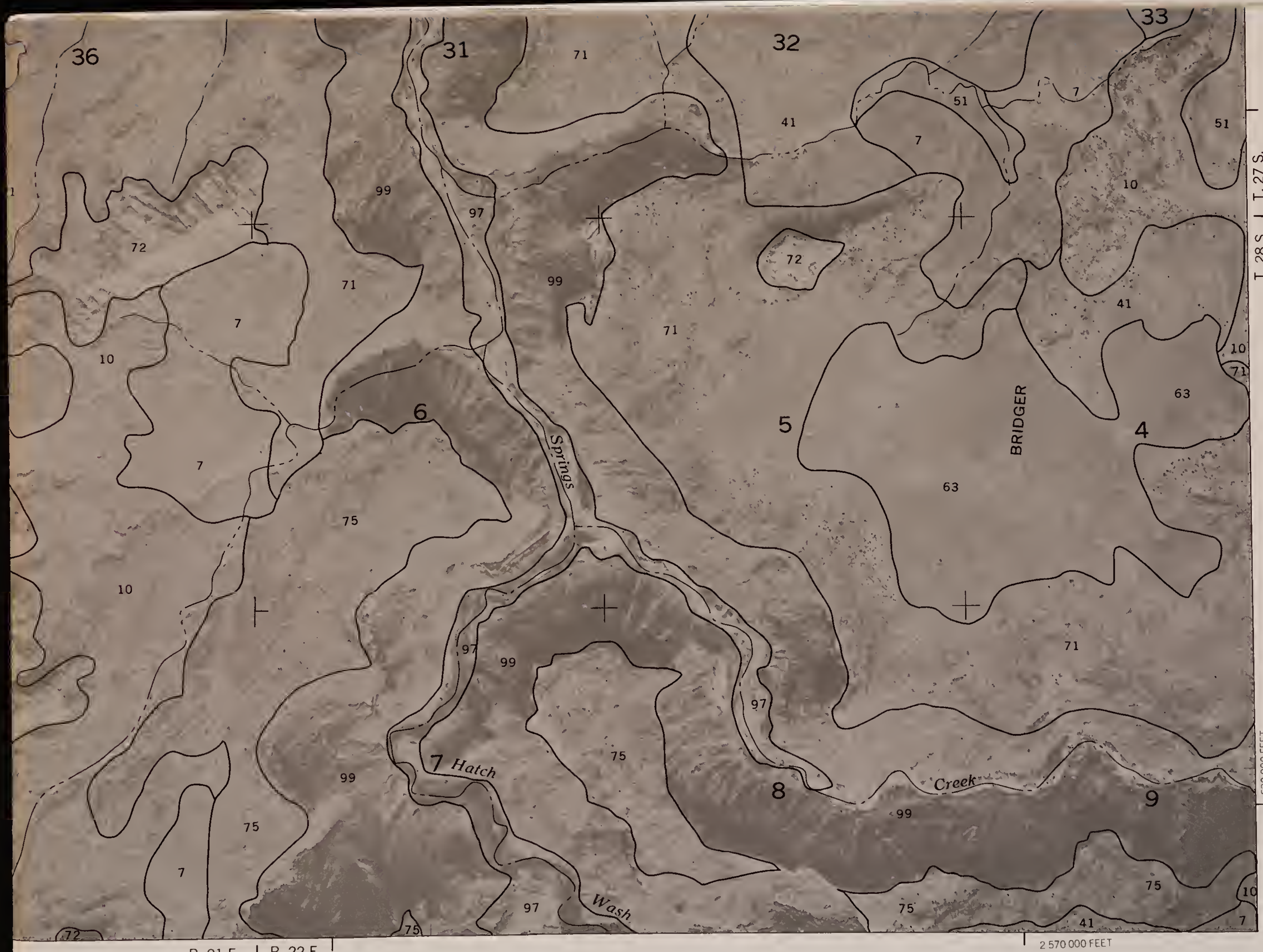


SHEET NO. 19
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 — 2 MILES

1 — 2 KILOMETERS

24 000

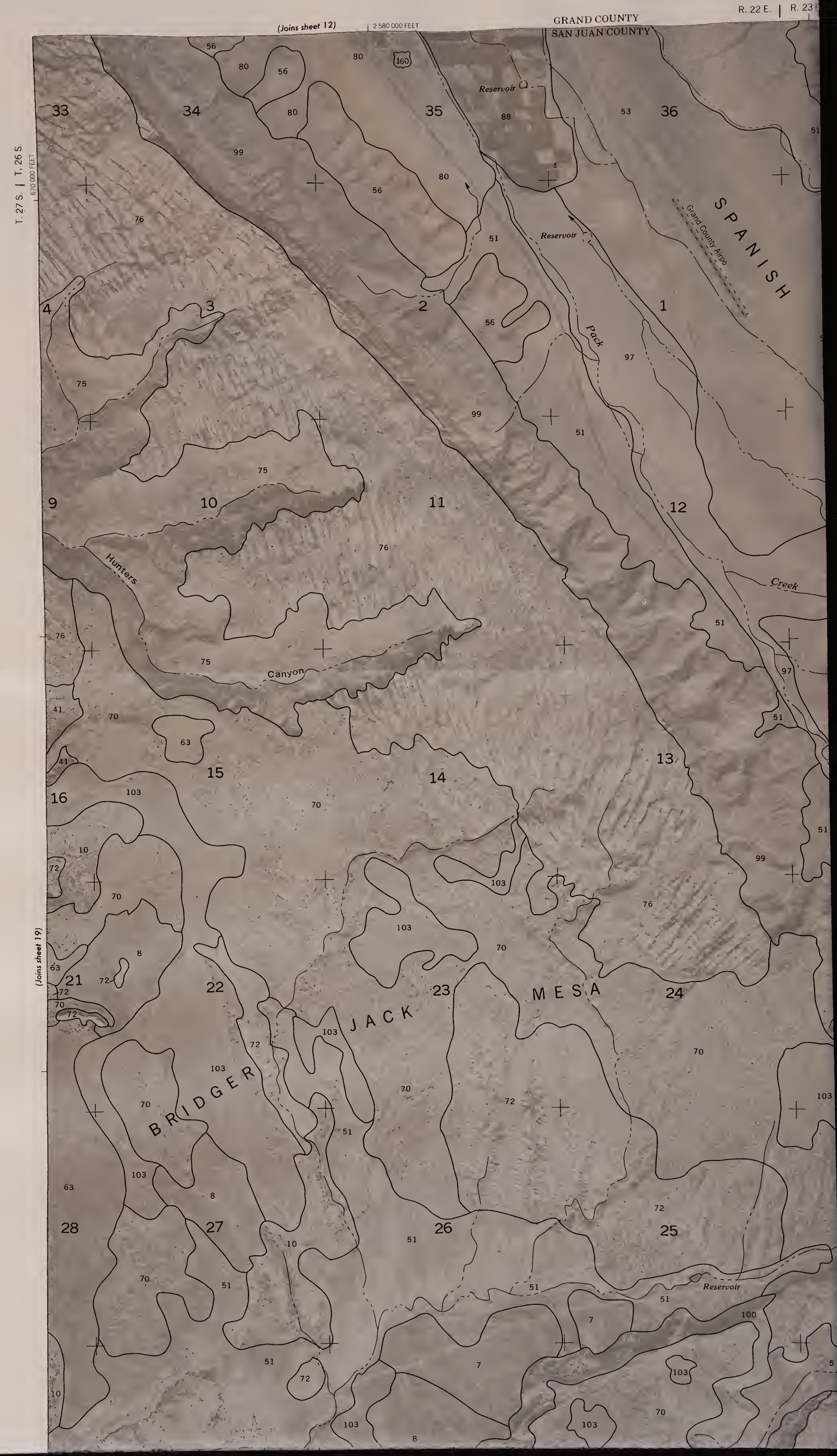
F GRAND AND SAN JUAN COUNTIES NO. 19

SHEET NO. 19 OF 57

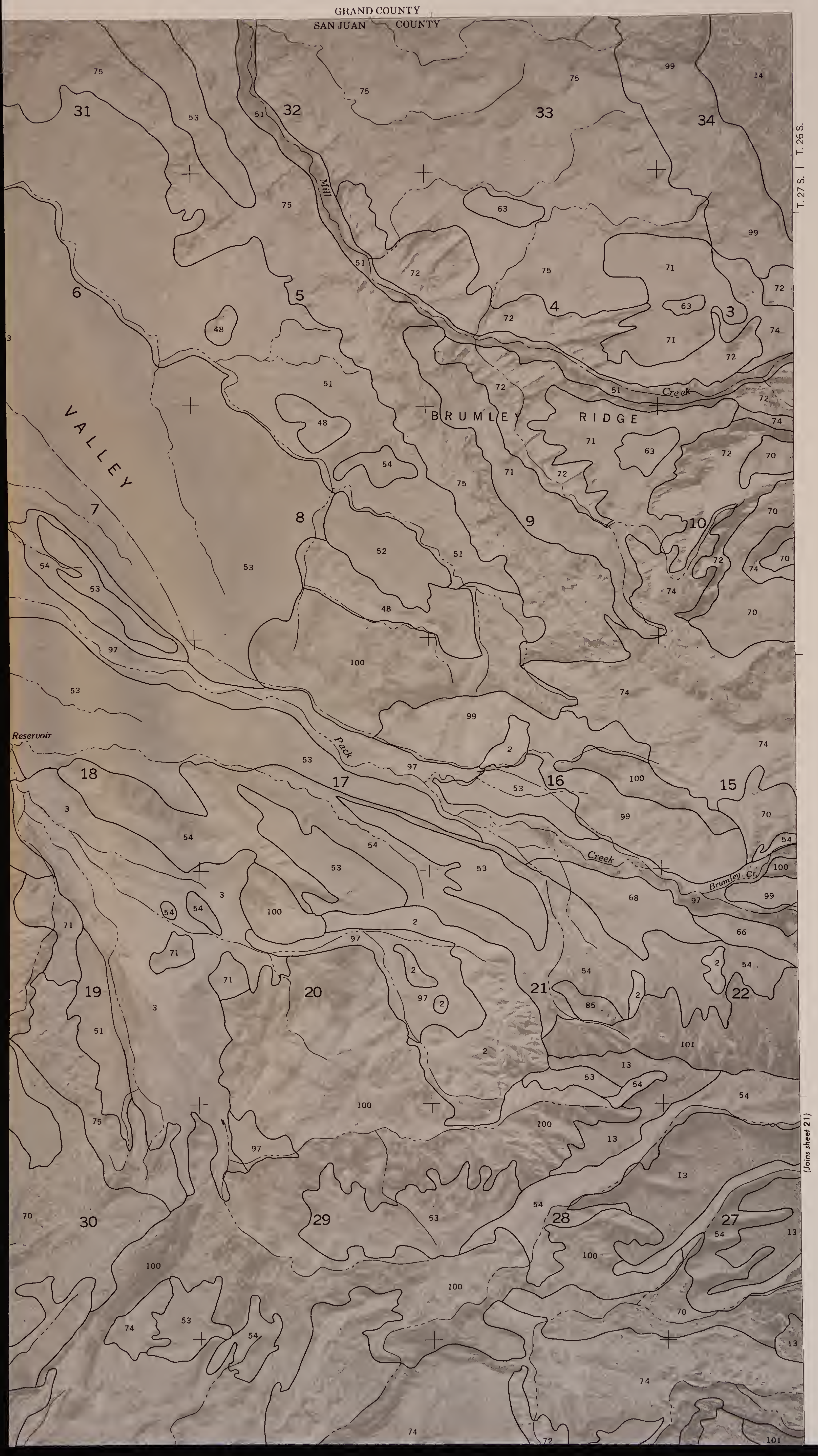
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

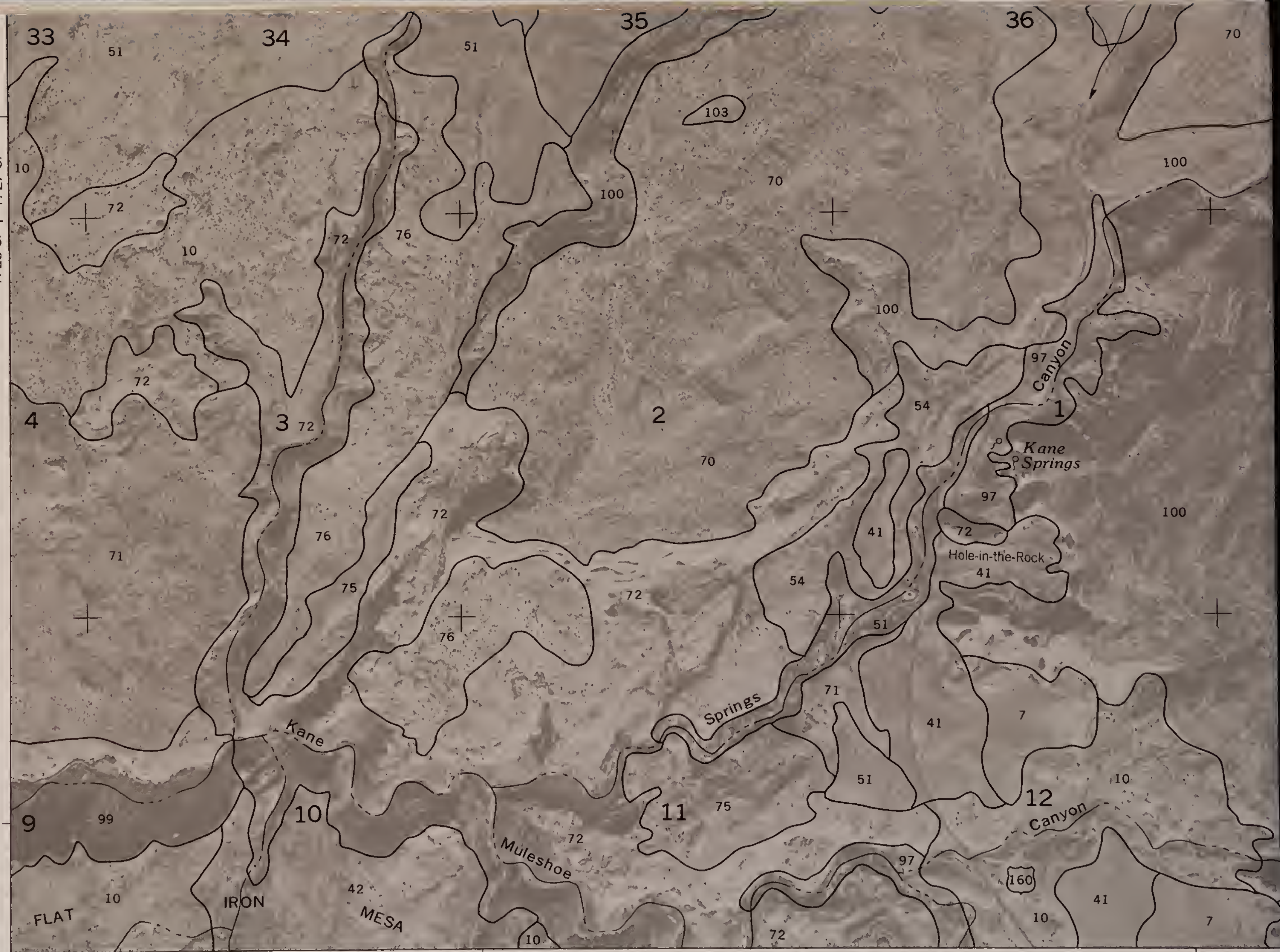
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 20
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





(Joins sheet 28)

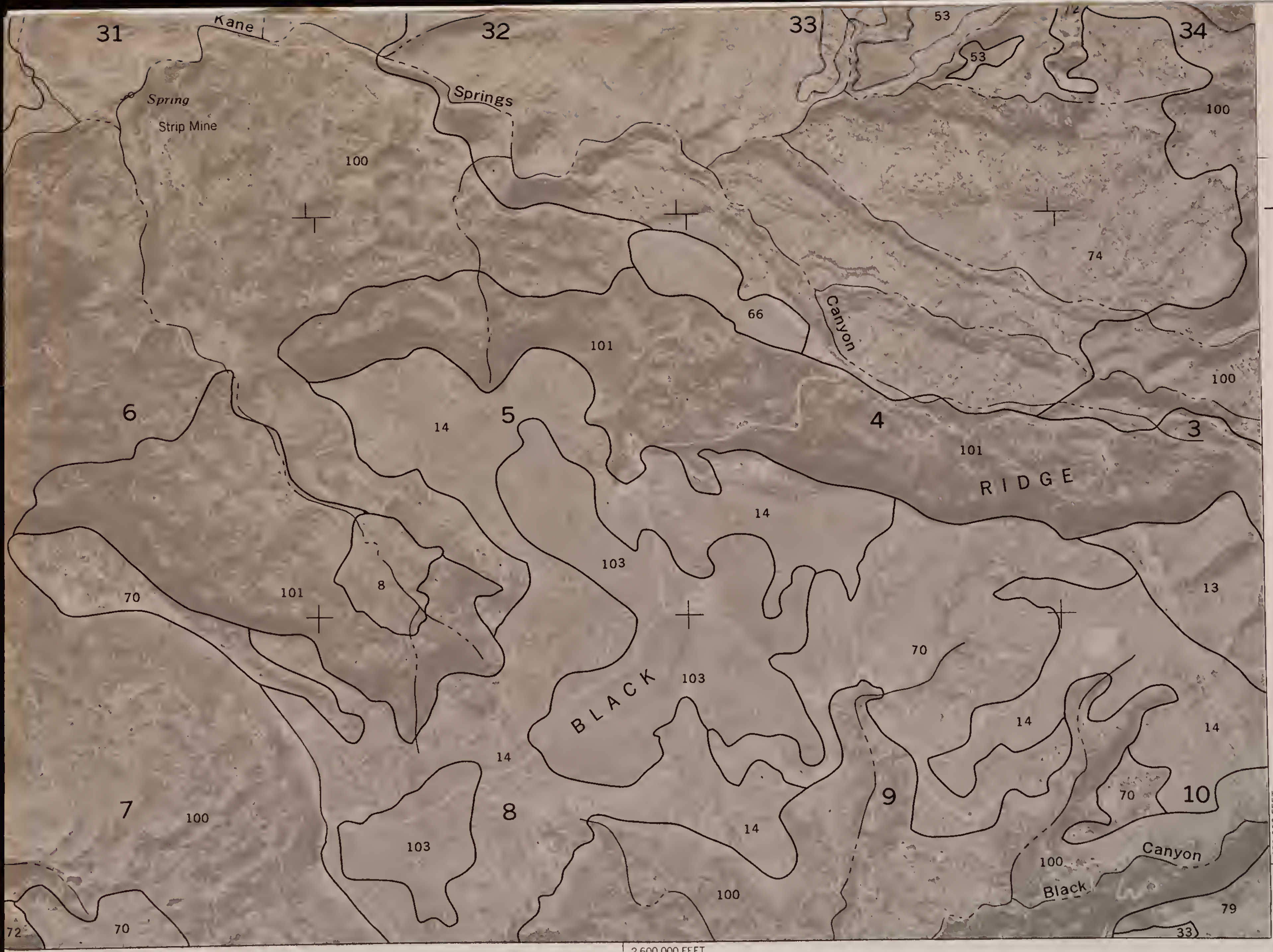
R. 22 E. | R. 23

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



E.

1
2 MILES

1
2 KILOMETERS

24 000

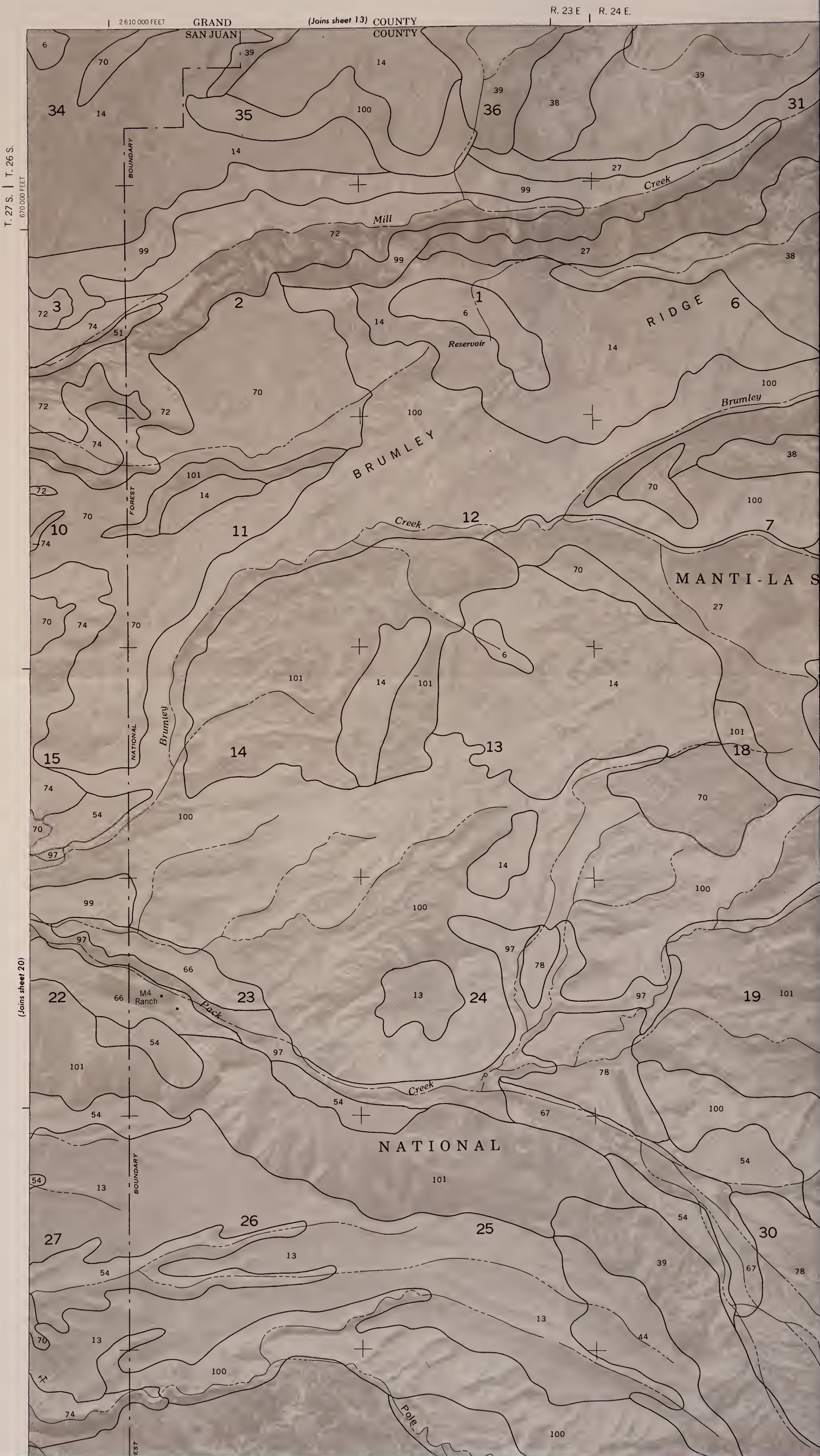
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 21
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

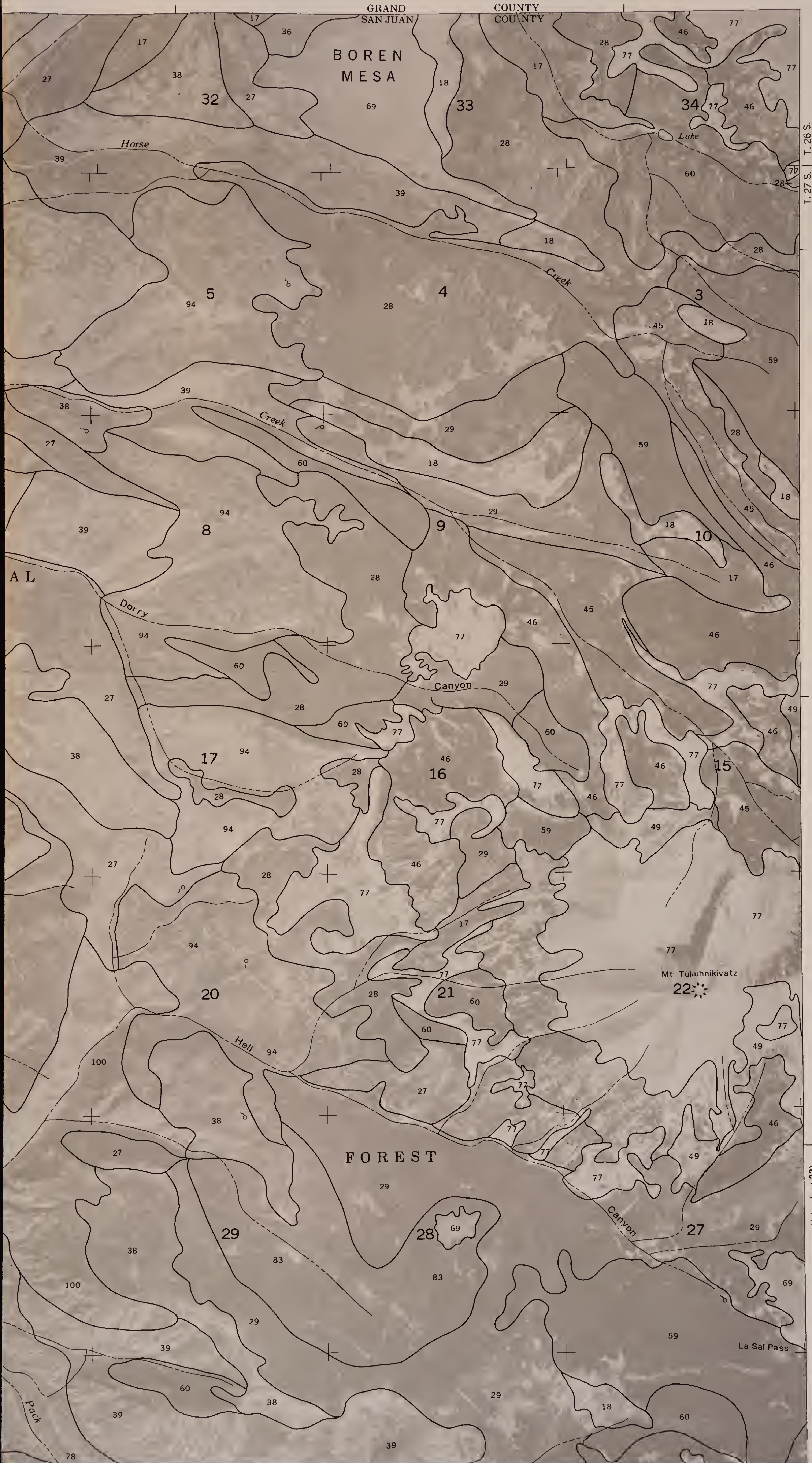
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

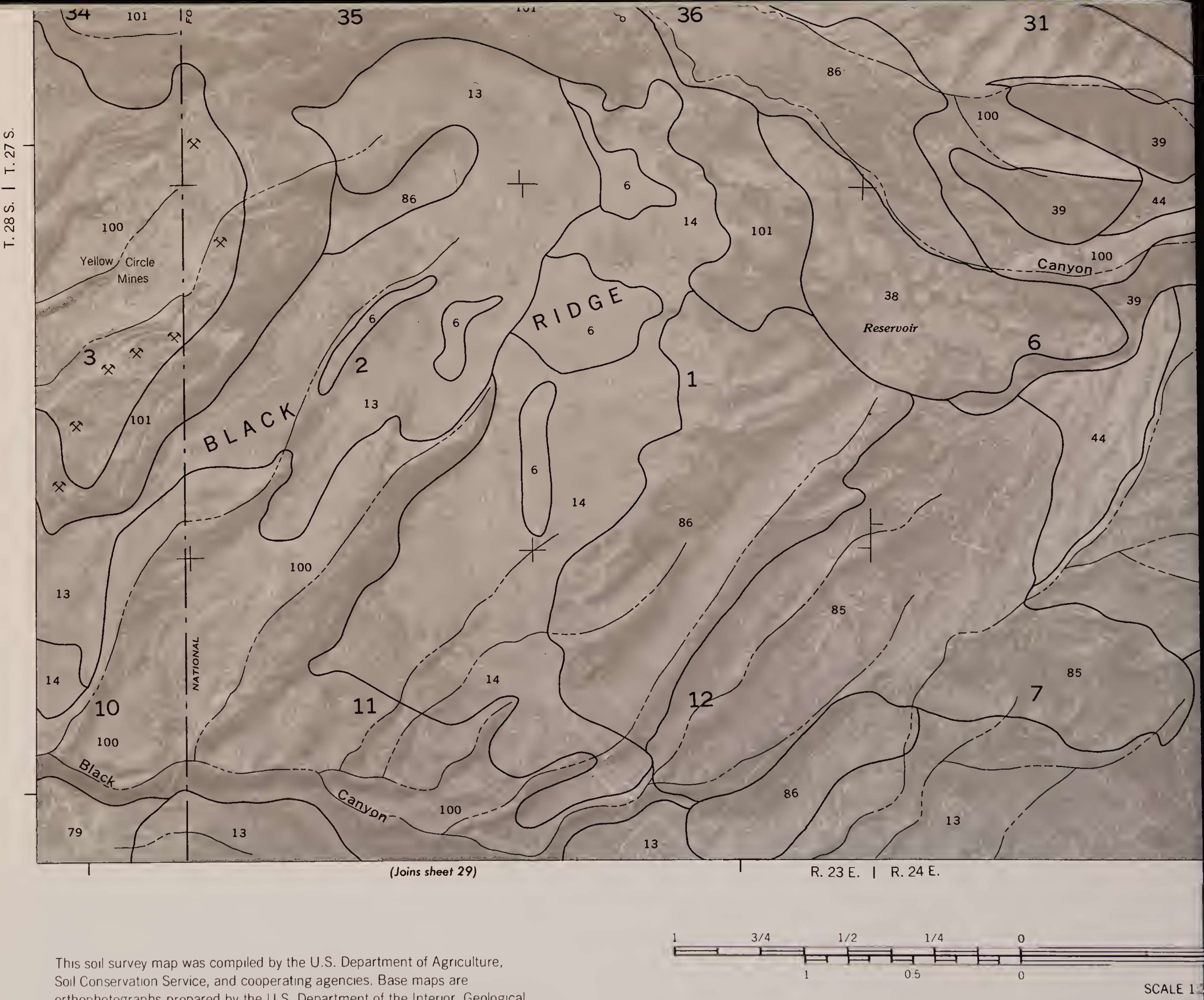
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

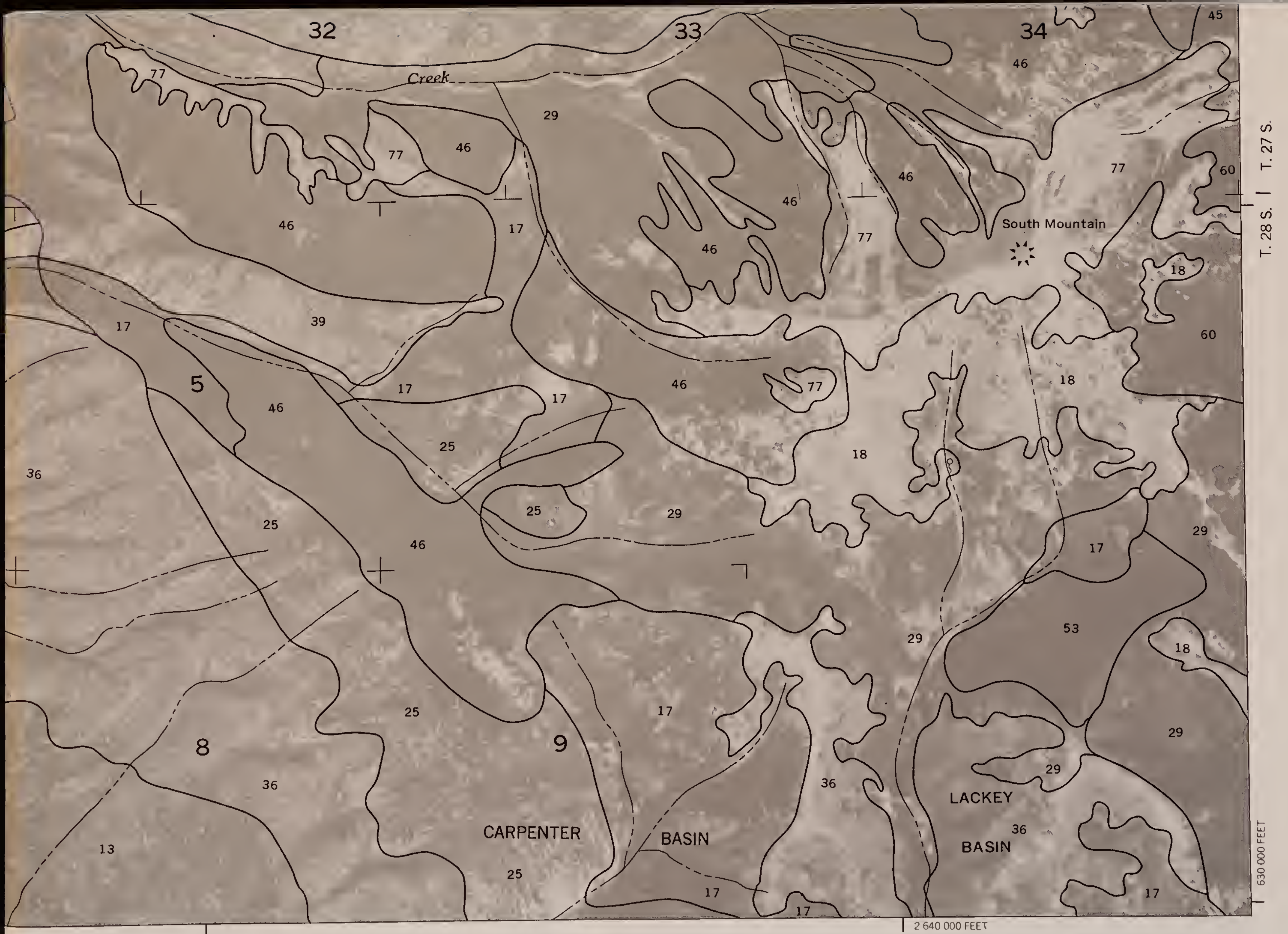


SHEET NO. 21
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



2 MILES

2 KILOMETERS

4 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE


MANTI-LA SAL
NATIONAL FOREST
FOREST BOUNDARY
Deep Creek
Lake
Ponds
Creek
Pond
Ditch
Geyser Creek
Reservoir
Hop Creek
Twomile
Canopy Gap
Canopy Spring
Beaver
T. 27 S. | T. 26 S.
(Joins sheet 23)

(Joins sheet 30)

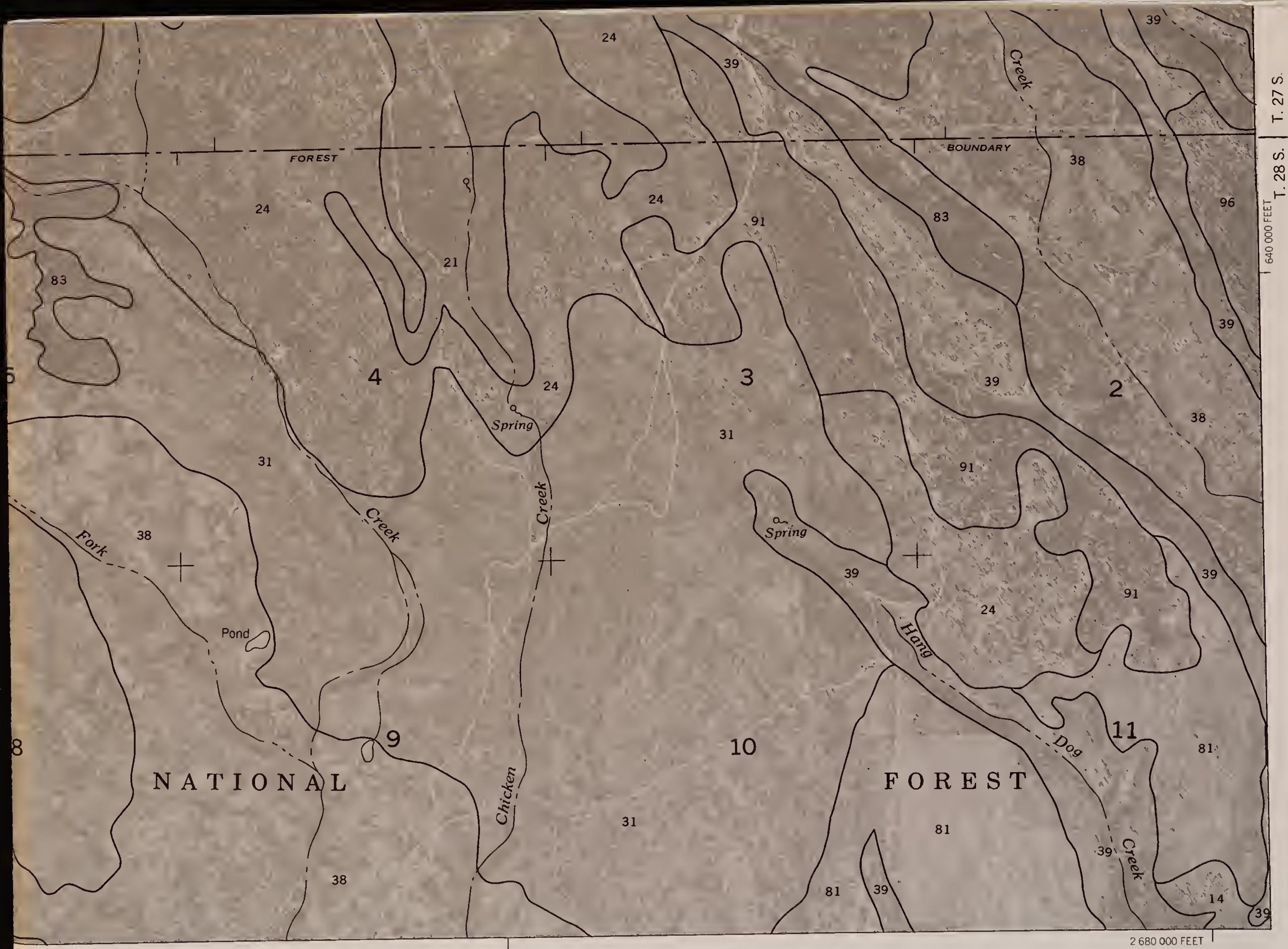
R. 24 E. | R. 25 E.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1
2 MILES
1
2 KILOMETERS
24 000

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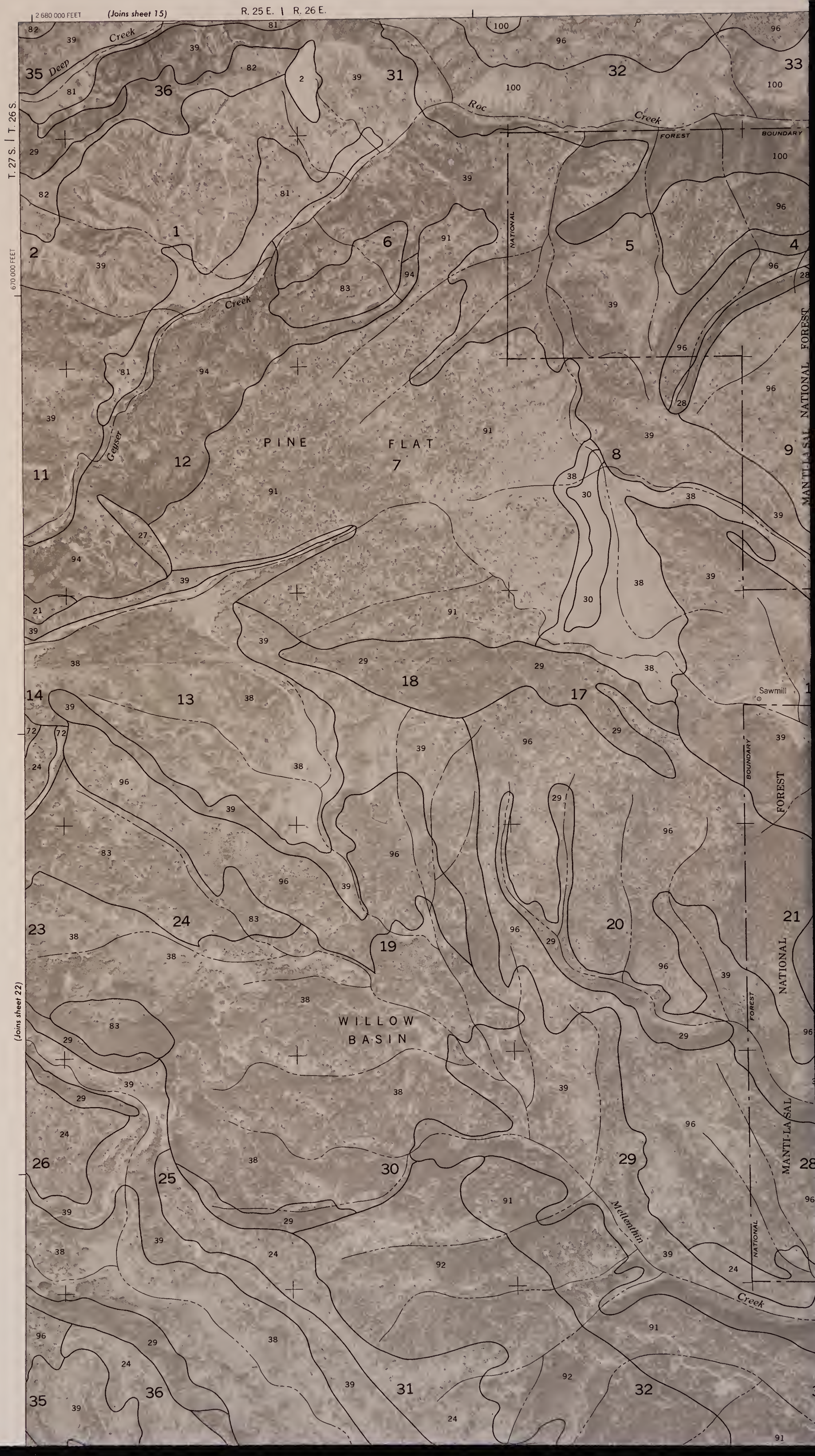
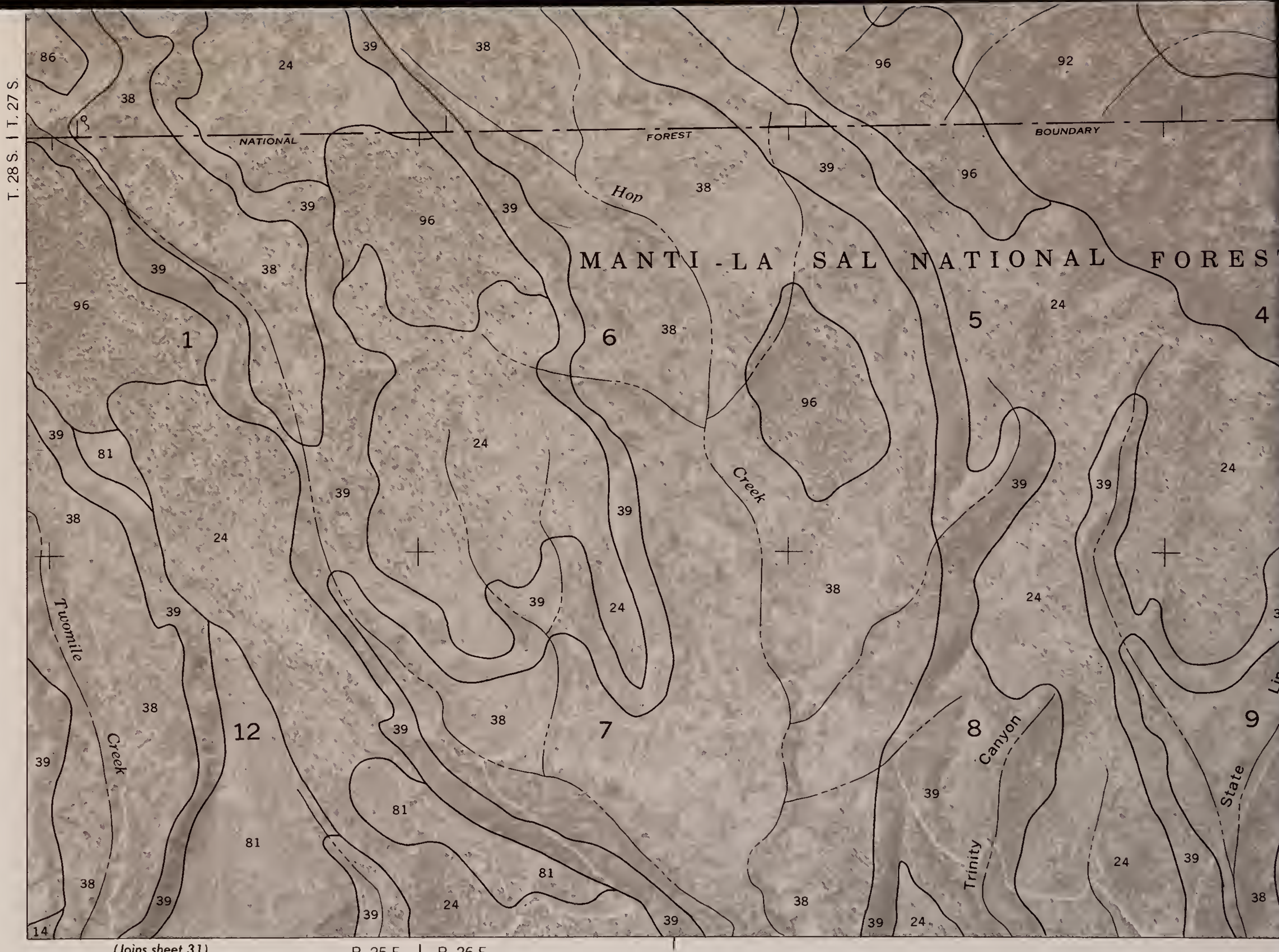
3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

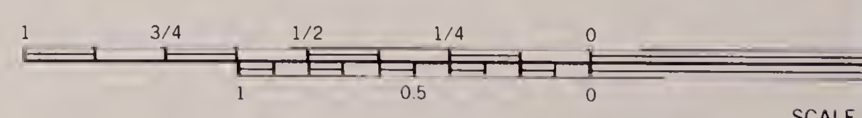
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



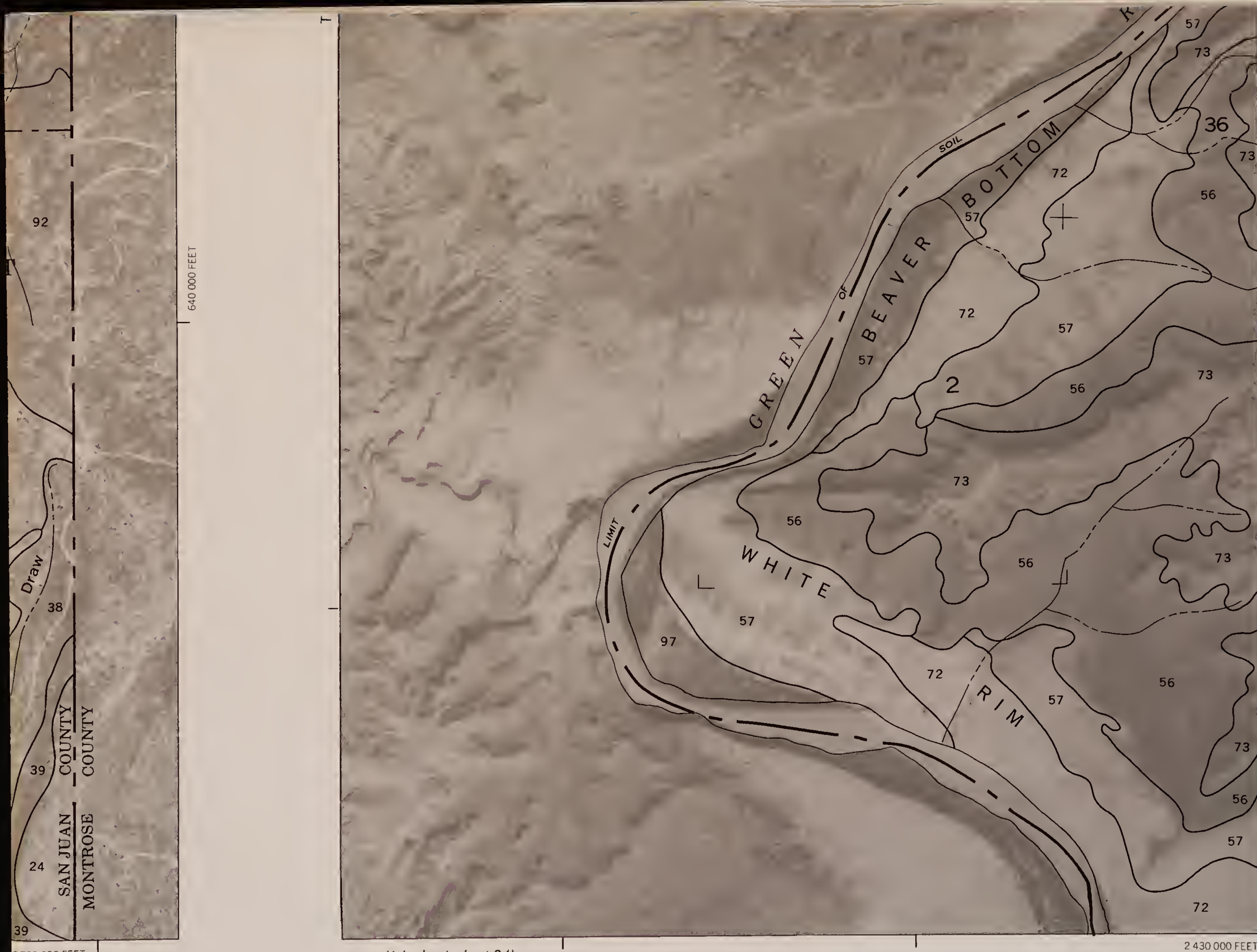
#24363150 ID:88071562

SHEET NO. 23
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



(Joins inset, sheet 24)

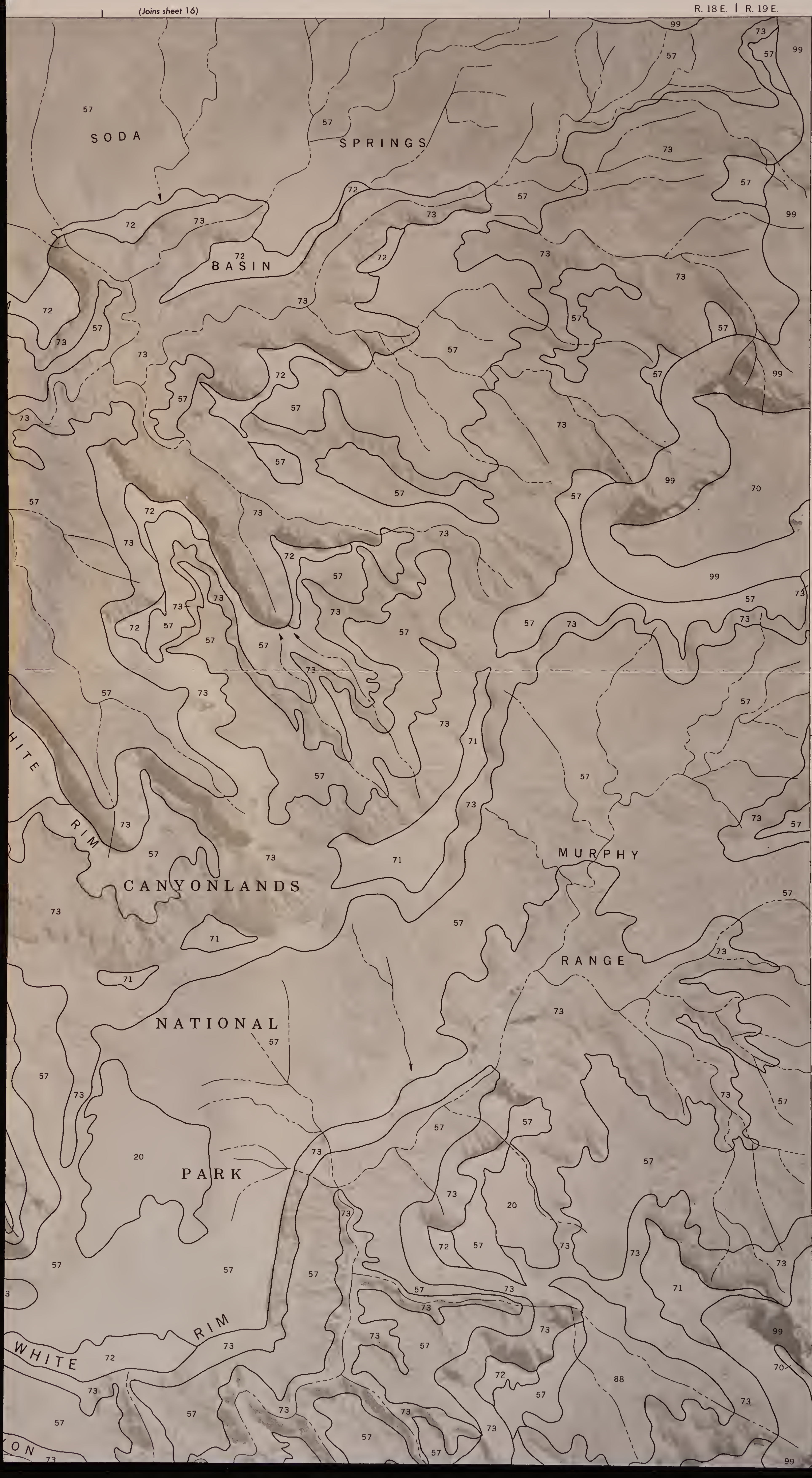
1
2 MILES
1
2 KILOMETERS
4 000

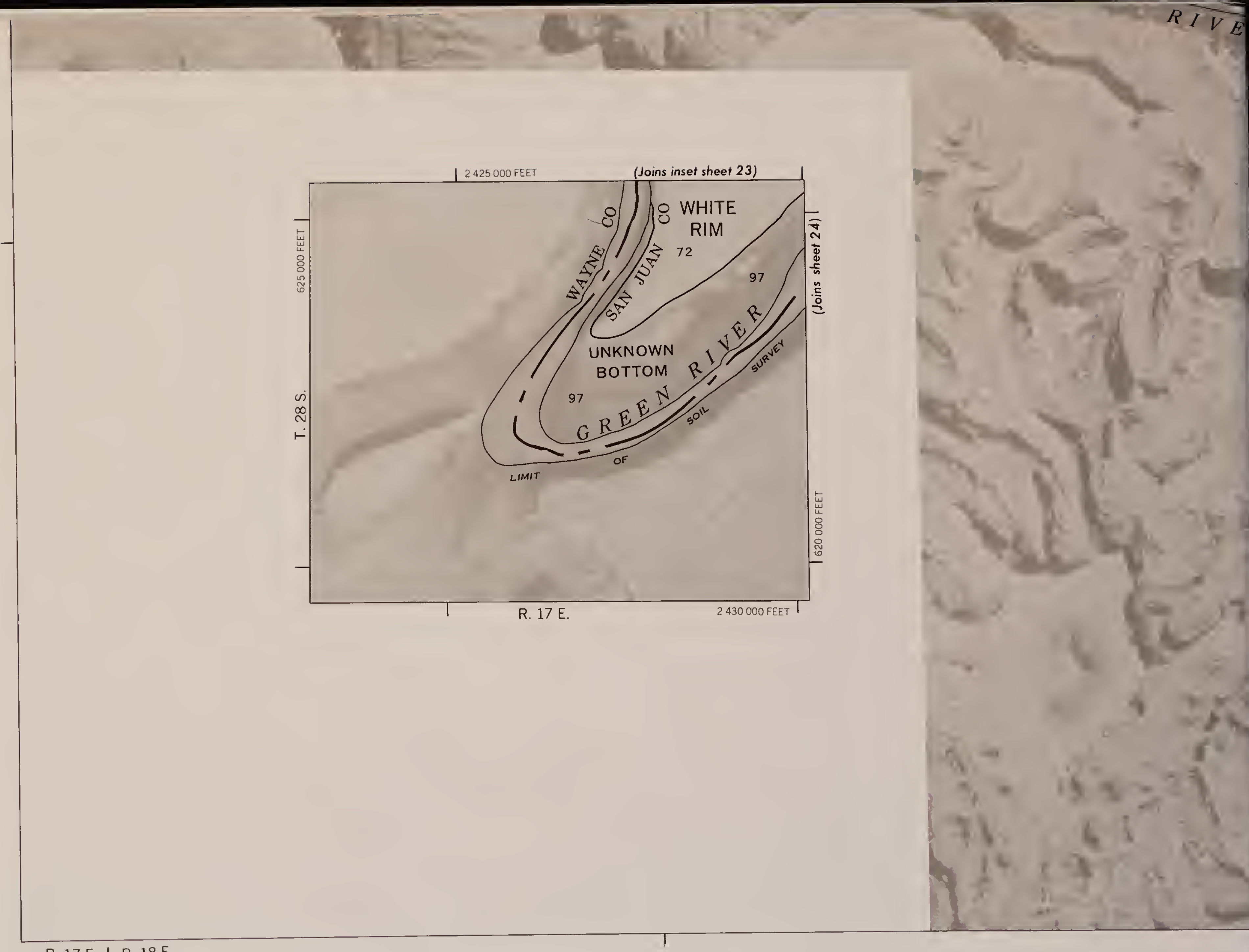
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 24
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



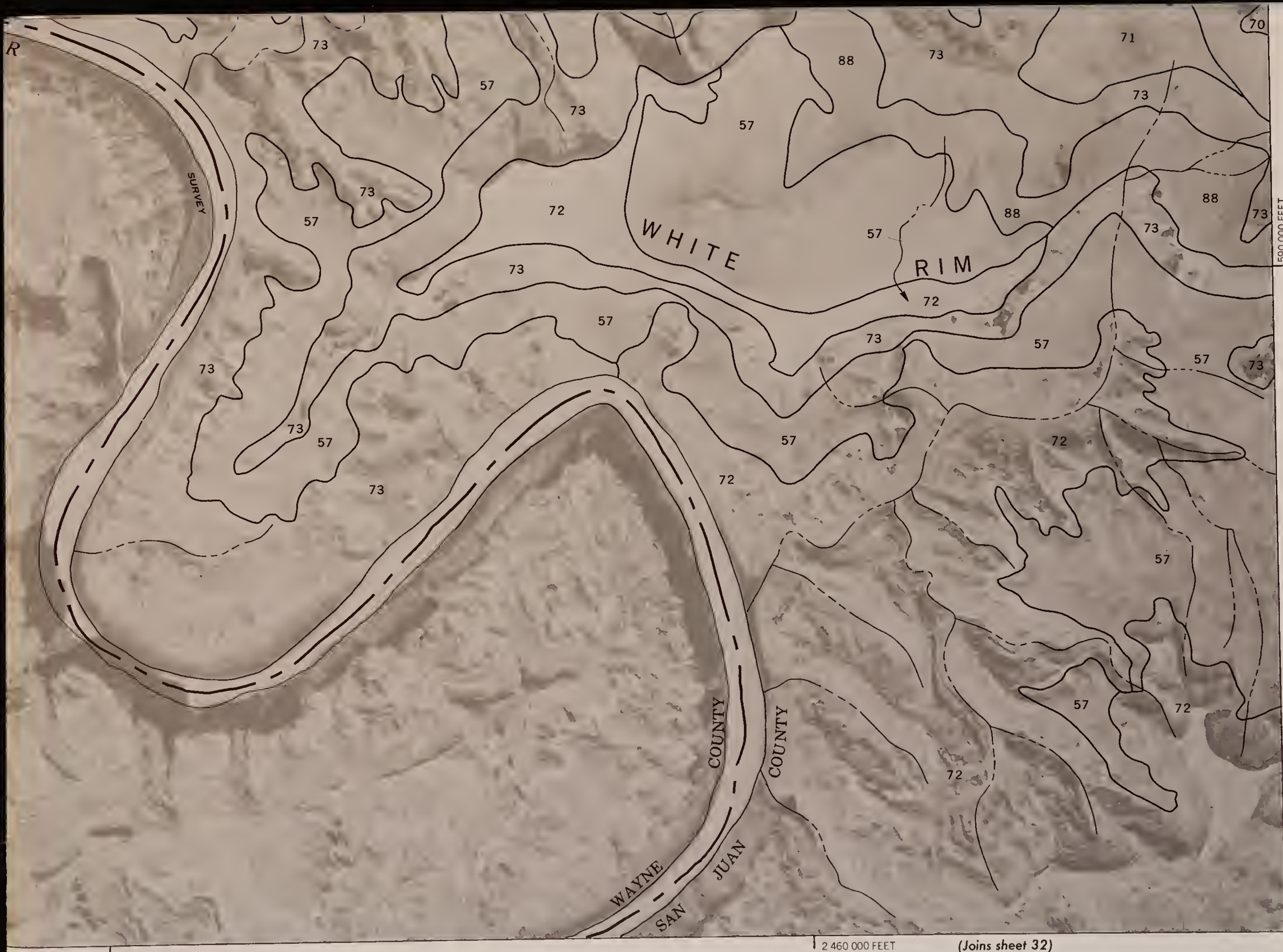


1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

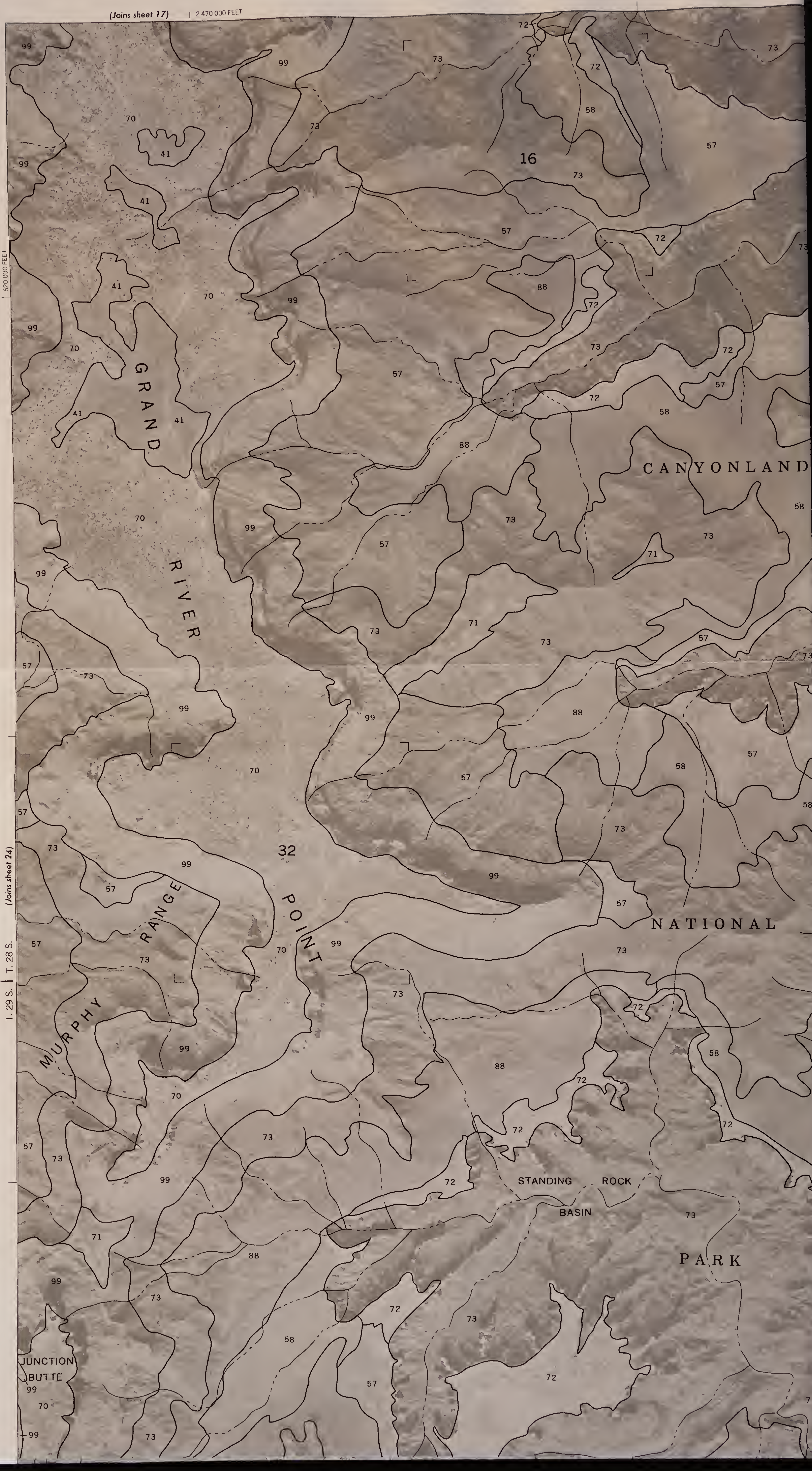
1 2 KILOMETERS

24 000

This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography Coordinate grid ticks and land division corners, if shown, are approximately positioned

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

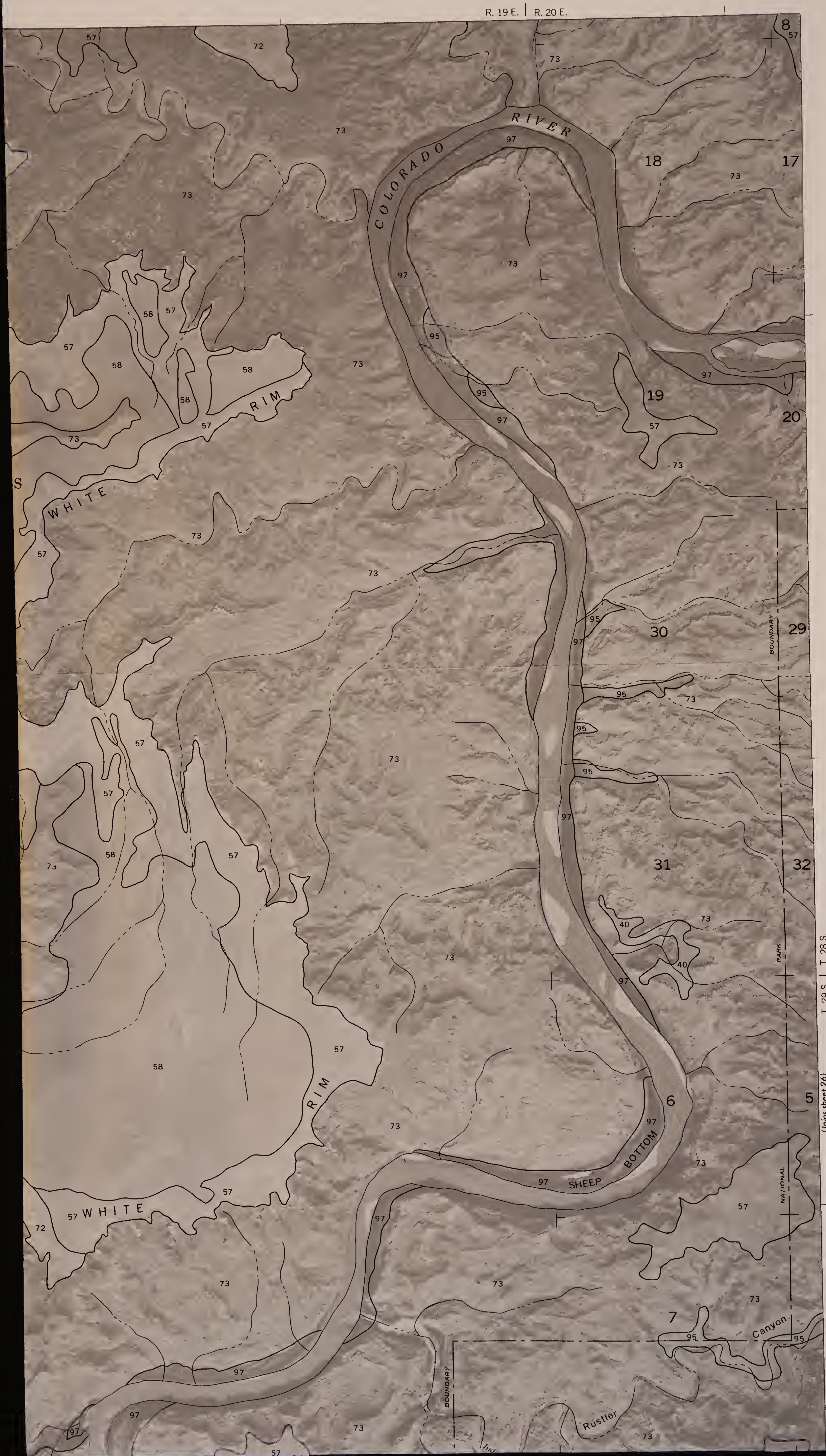
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

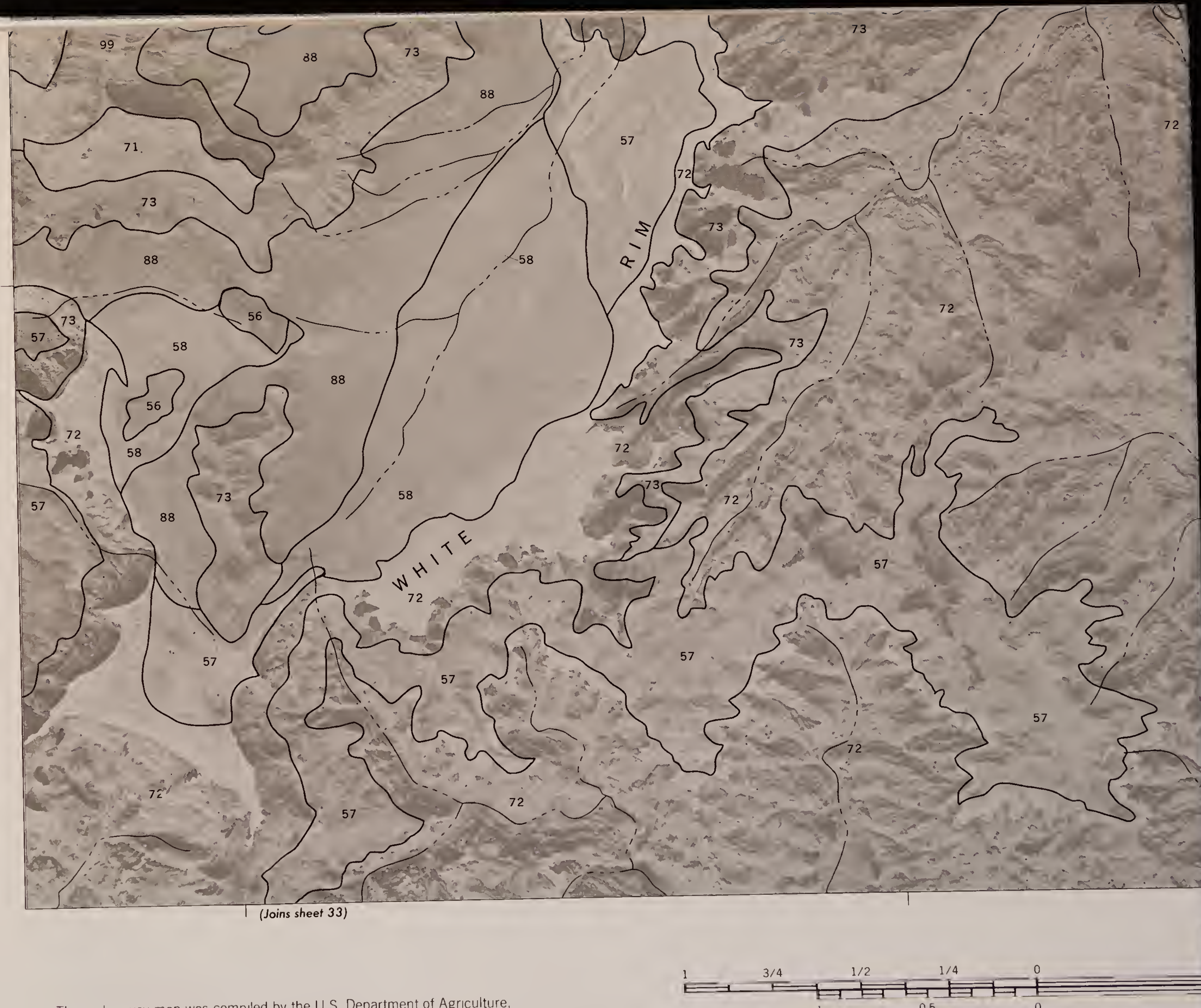


#24363150 ID: 88071562

SHEET NO. 25

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





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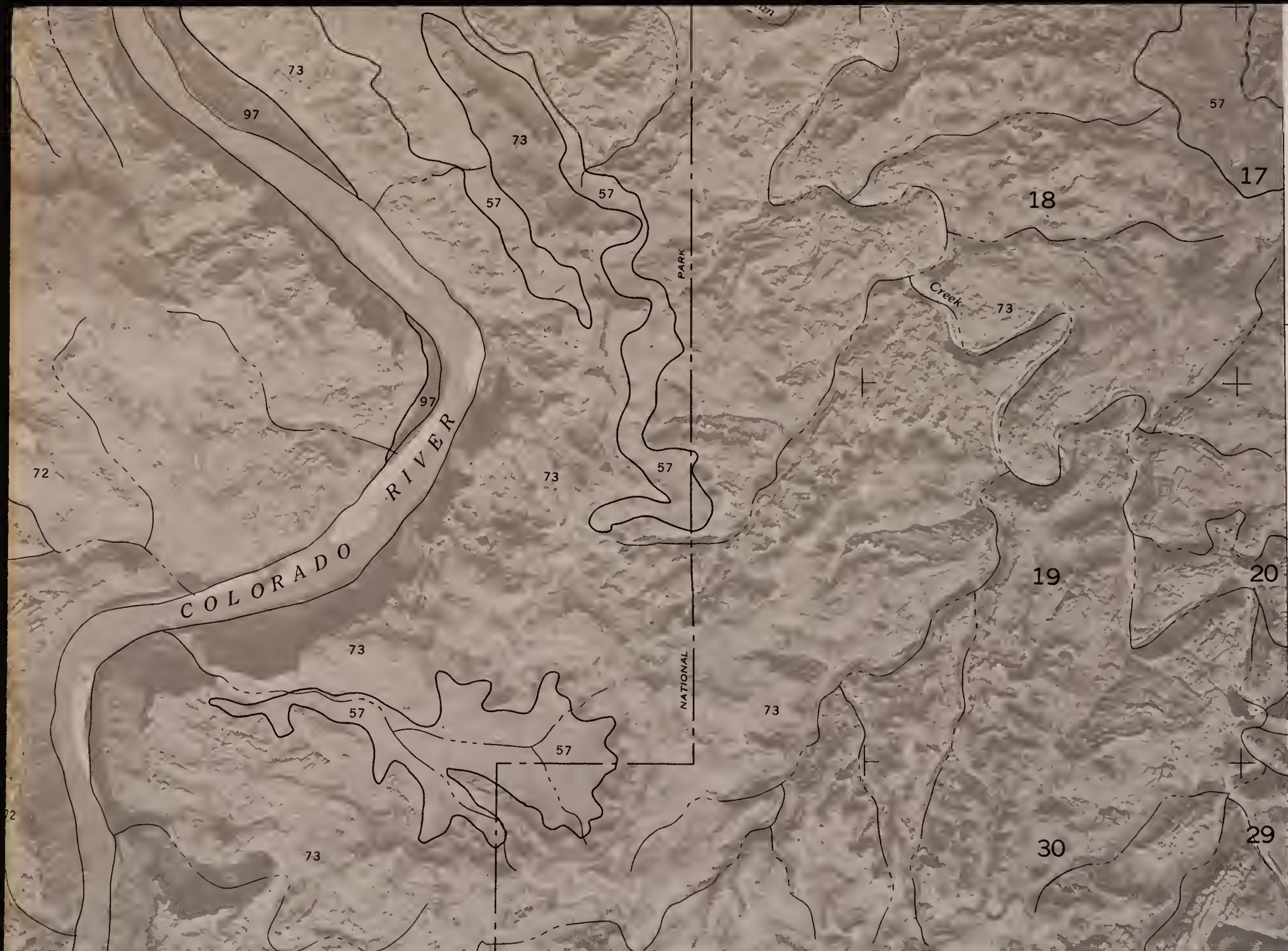
CANYONLANDS AREA, UTAH, PARTS OF



R. 19 E. | R. 20 E.

2 500 000 FEET

1 2 MILES

1 2 KILOMETERS

24 000

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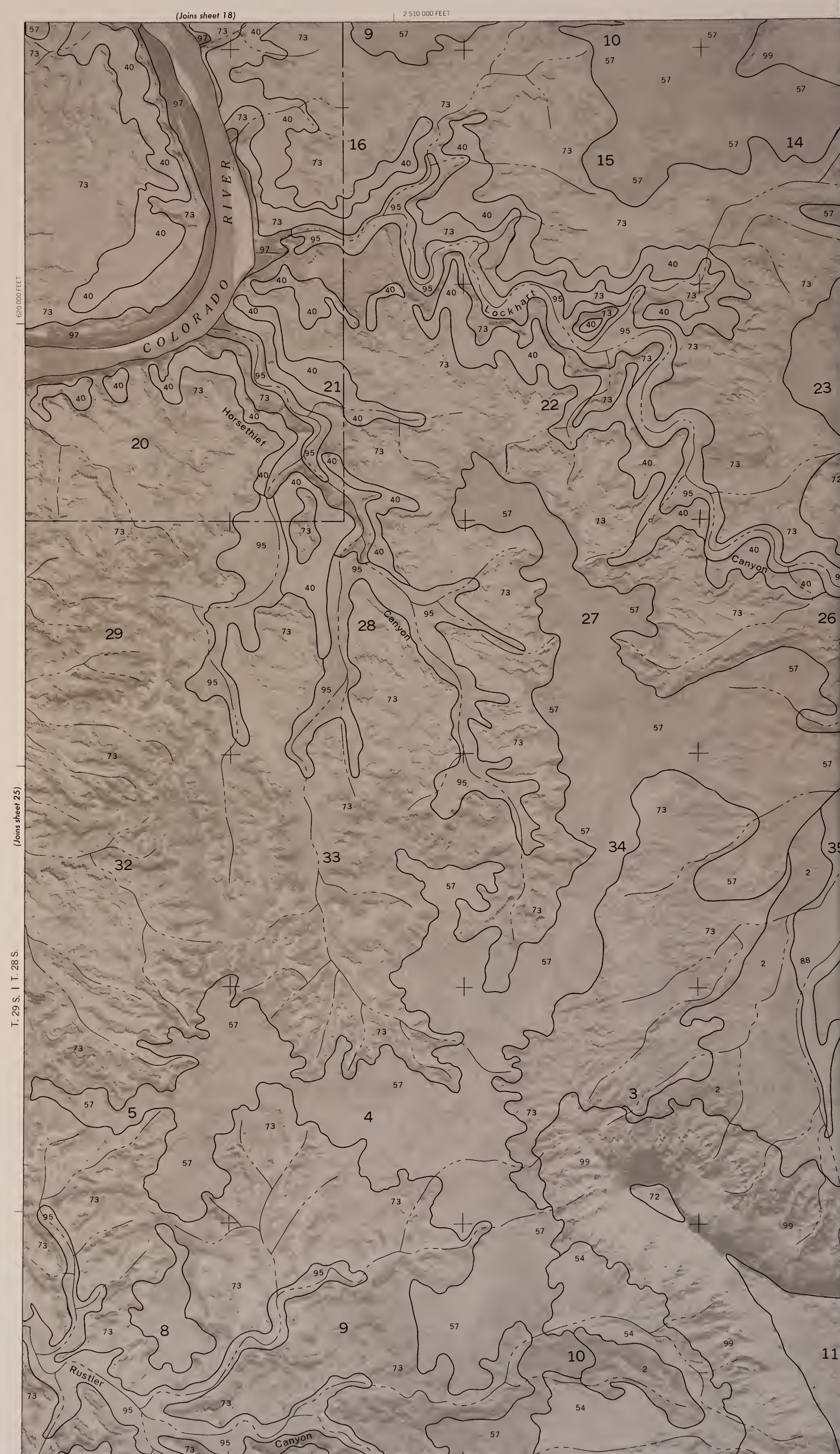
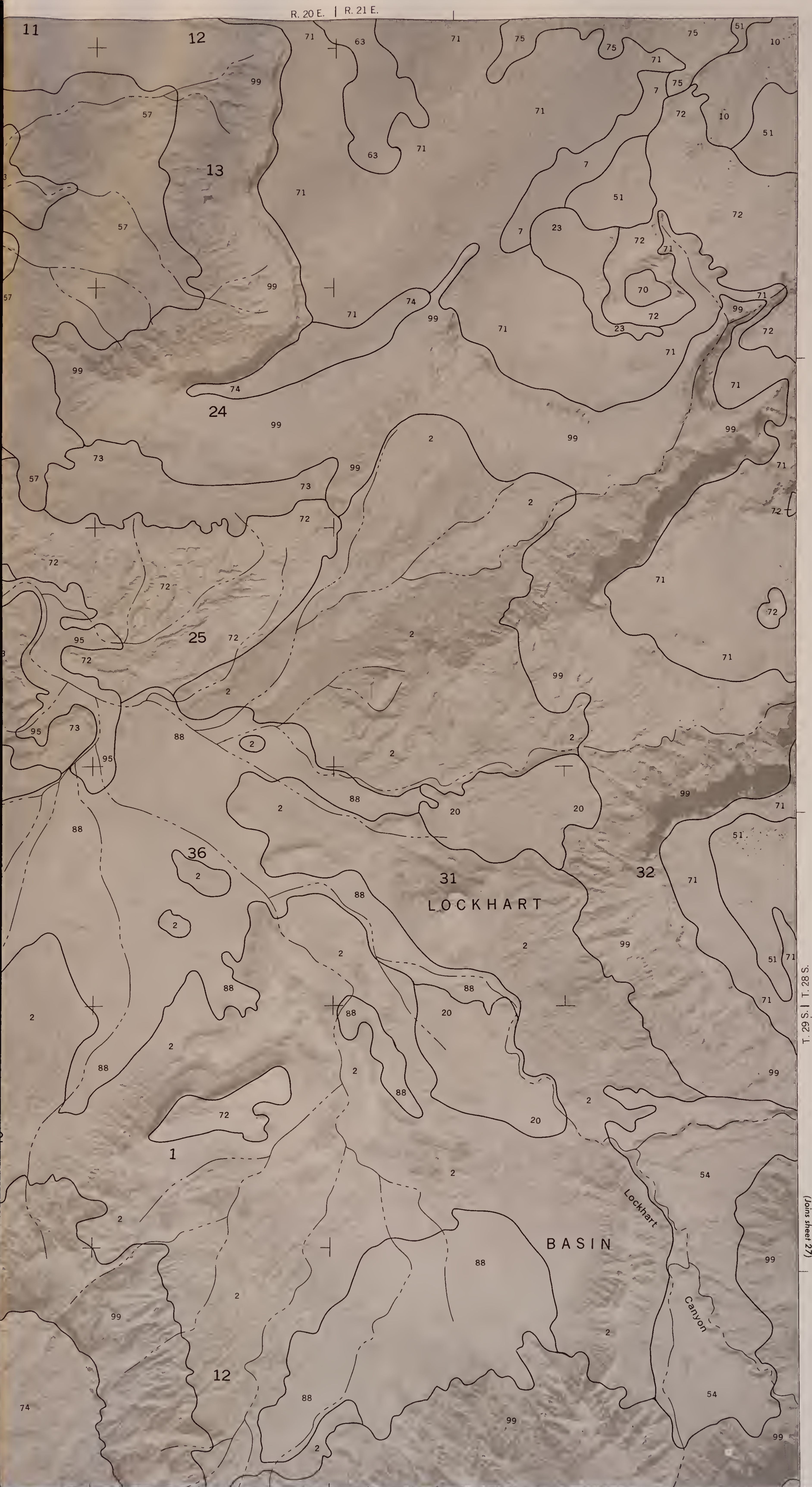
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

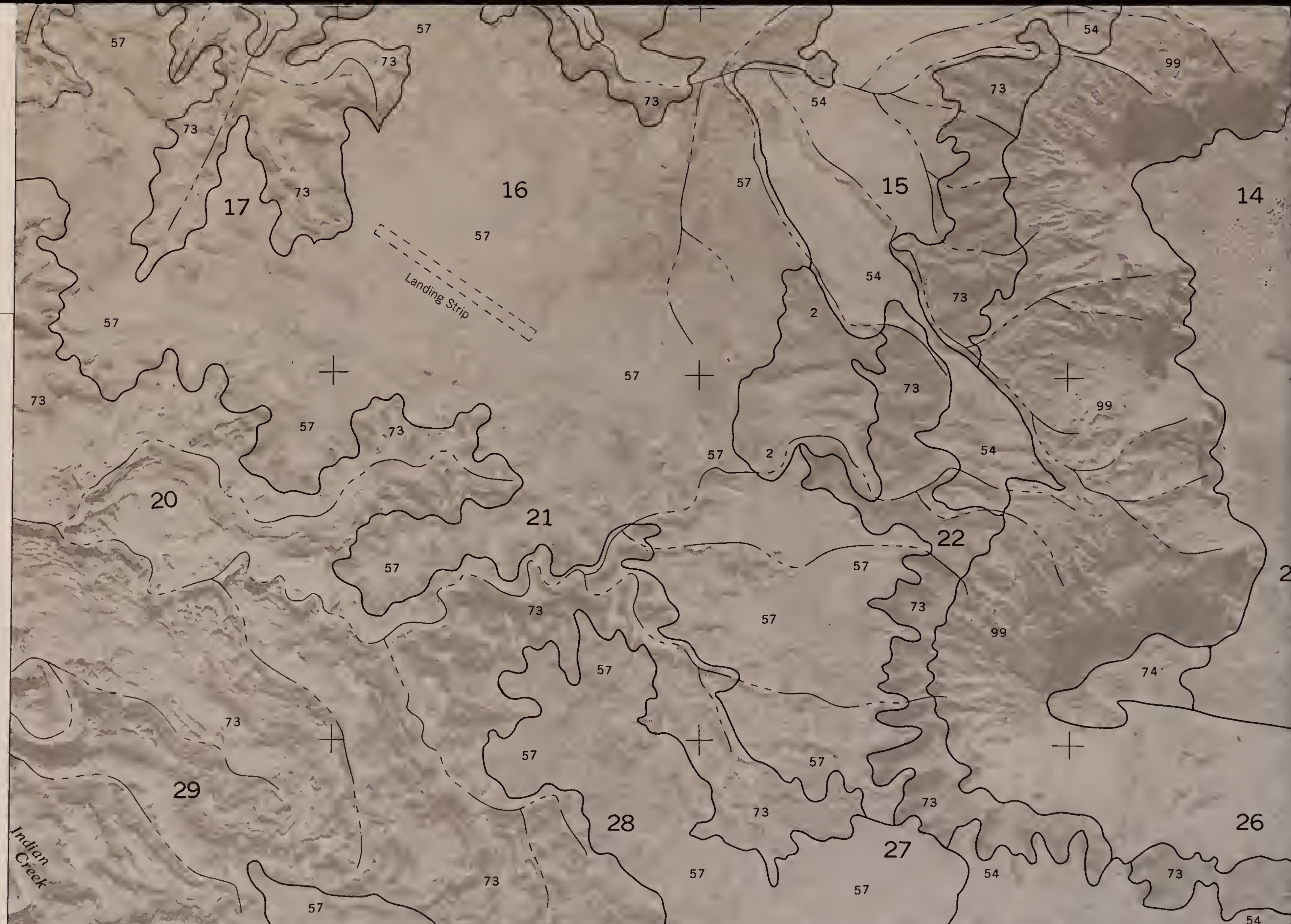
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 26

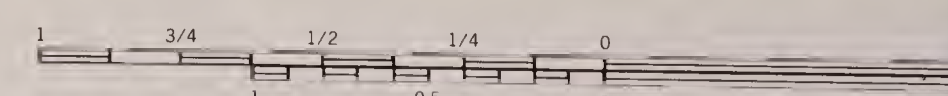
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





(Joins sheet 34)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



SCALE 1:24 000

AND SAN JUAN COUNTIES NO. 26

SHEET NO. 26 OF 57

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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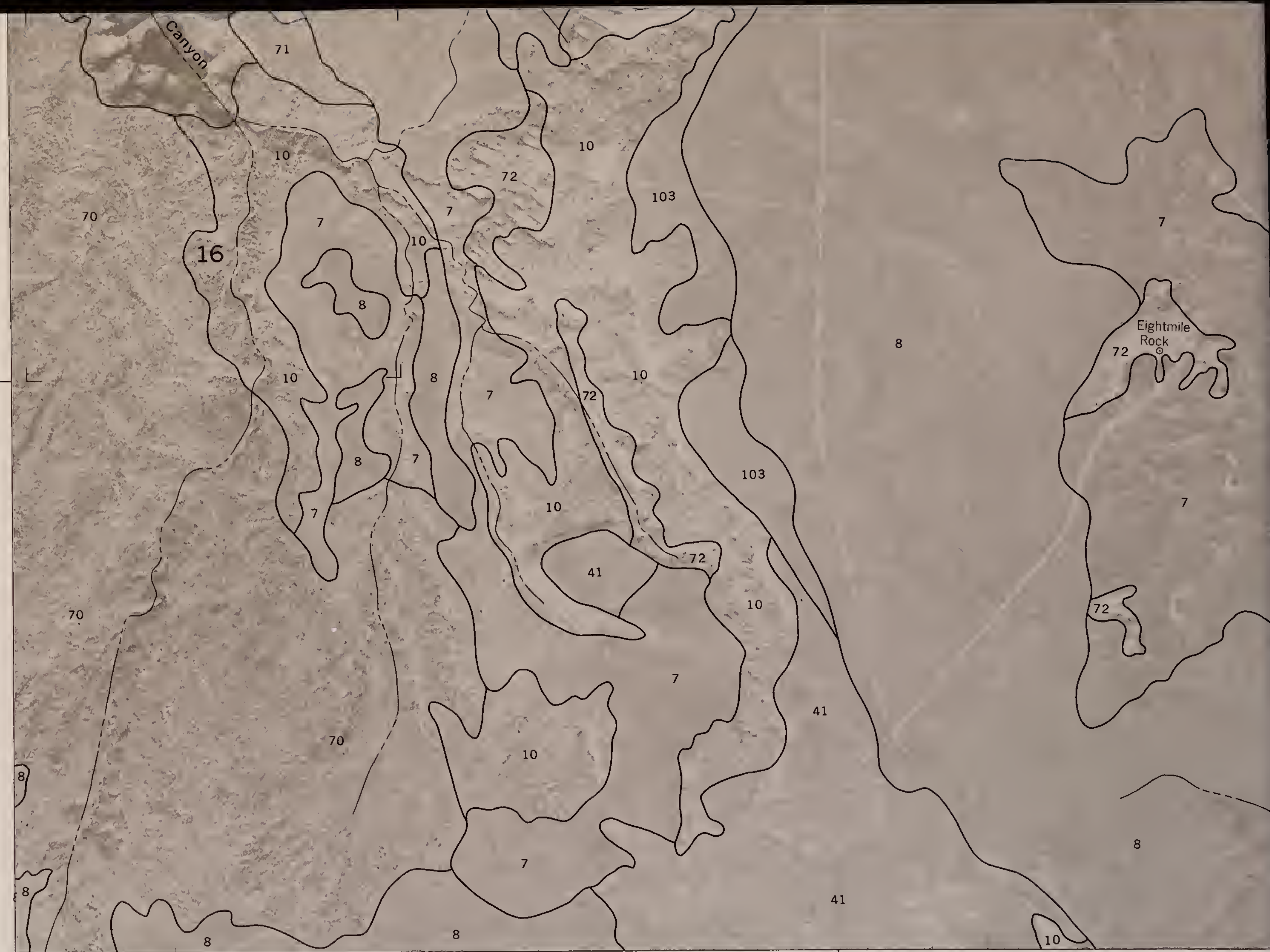
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 27

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

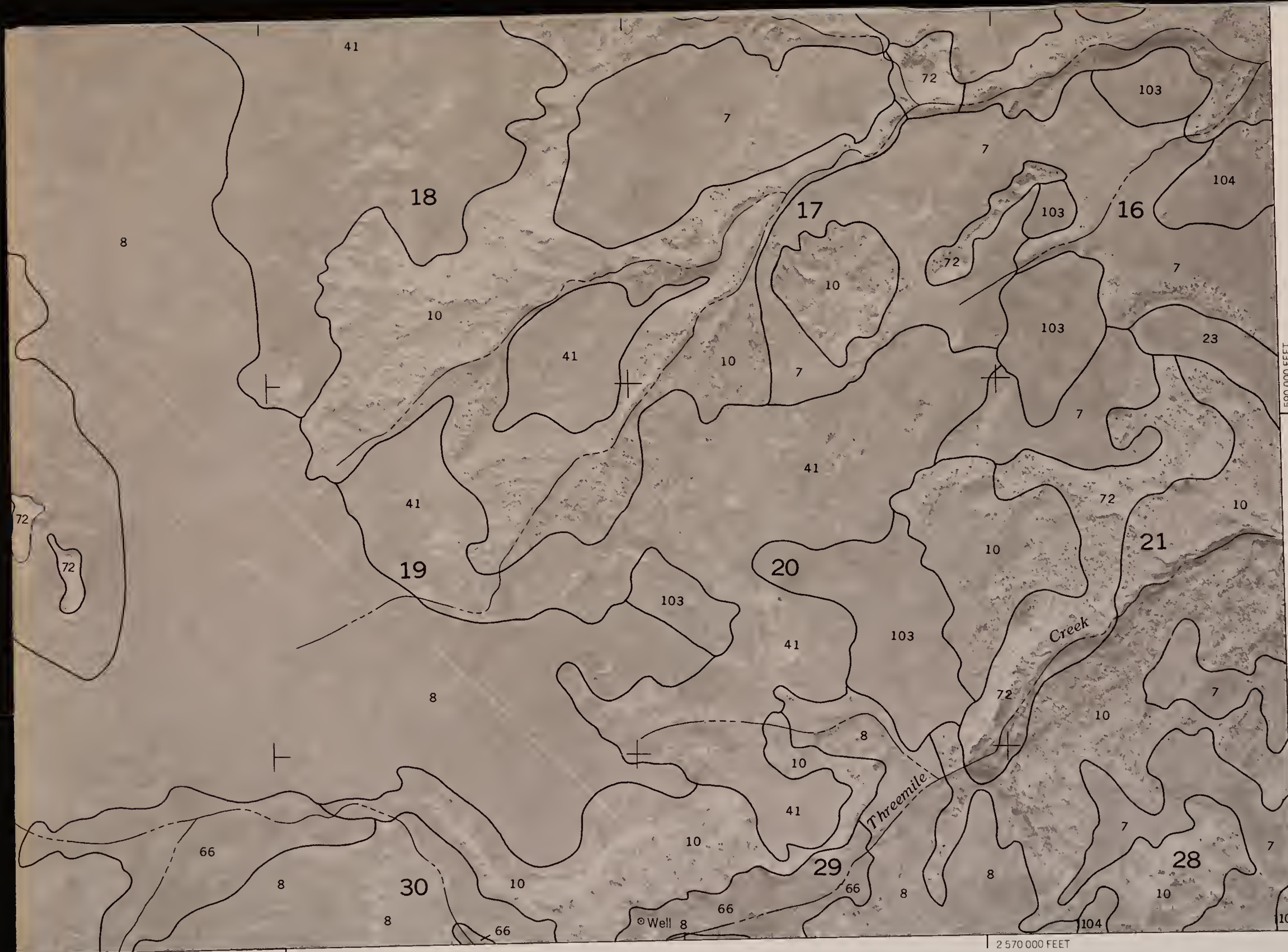


(Joins sheet 35)

1 3/4 1/2 1/4 0
1 0.5 0
SCALE

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS O



R. 21 E. | R. 22 E.

1 2 MILES

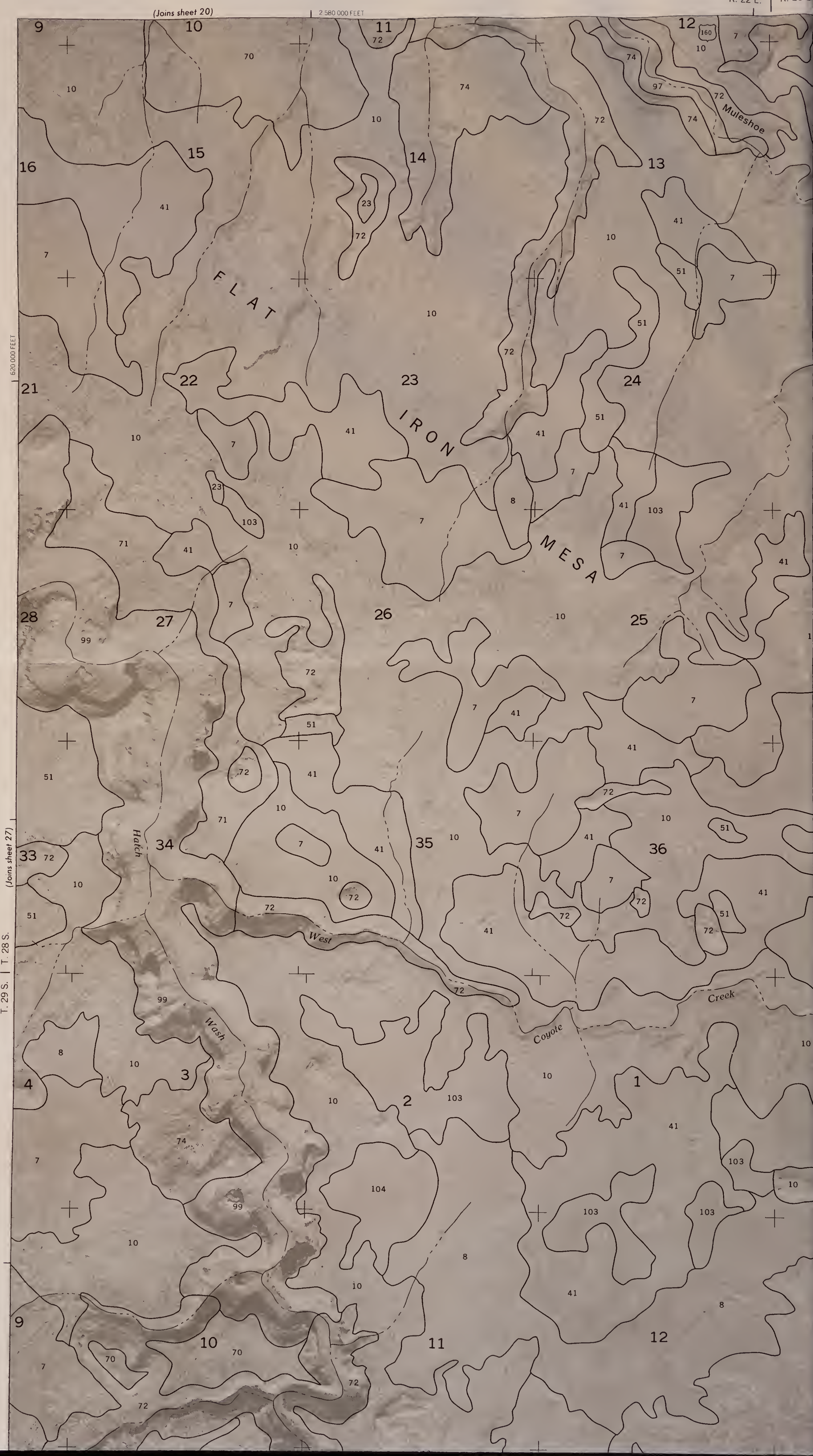
1 2 KILOMETERS

1:24 000

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

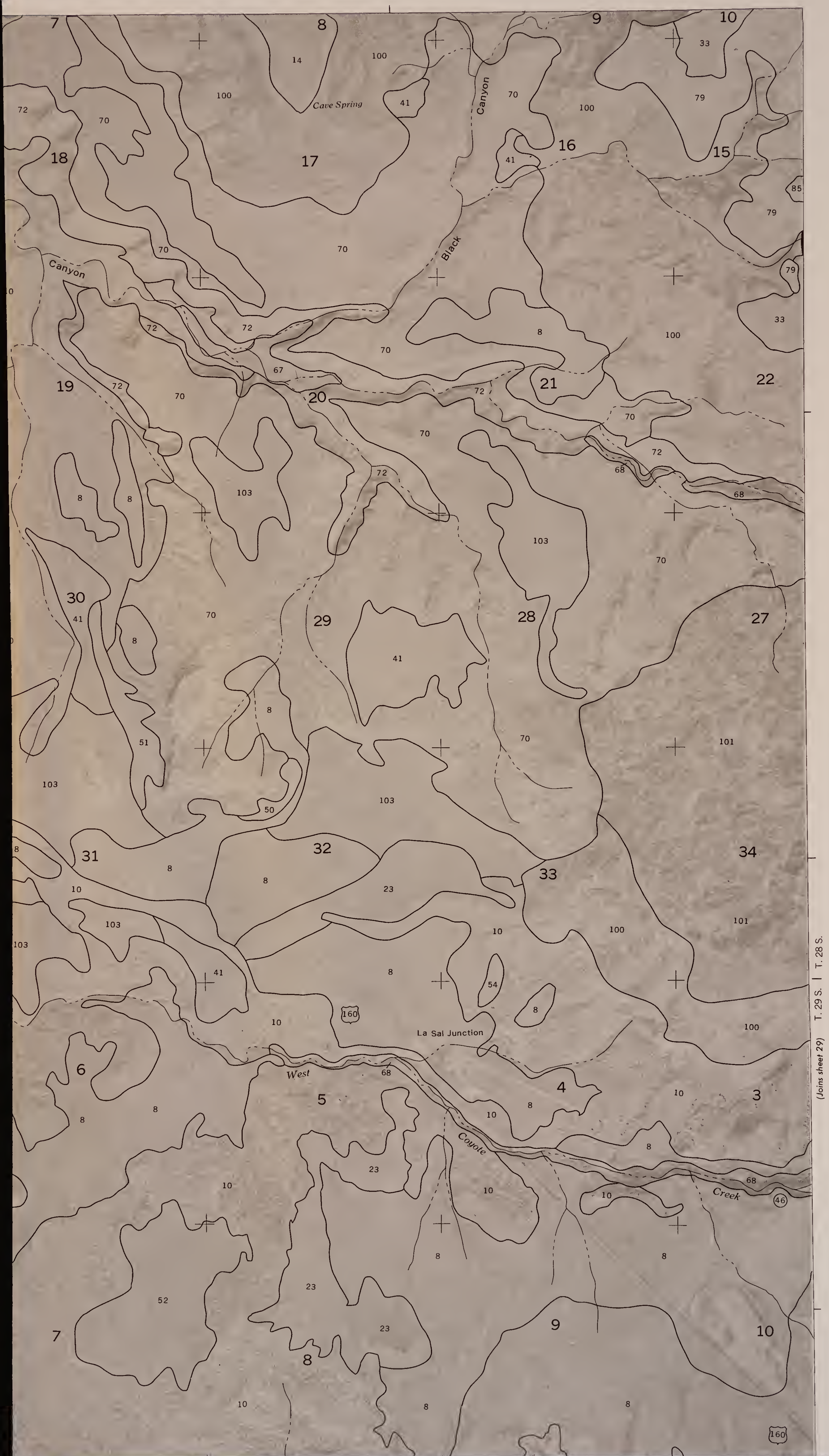
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

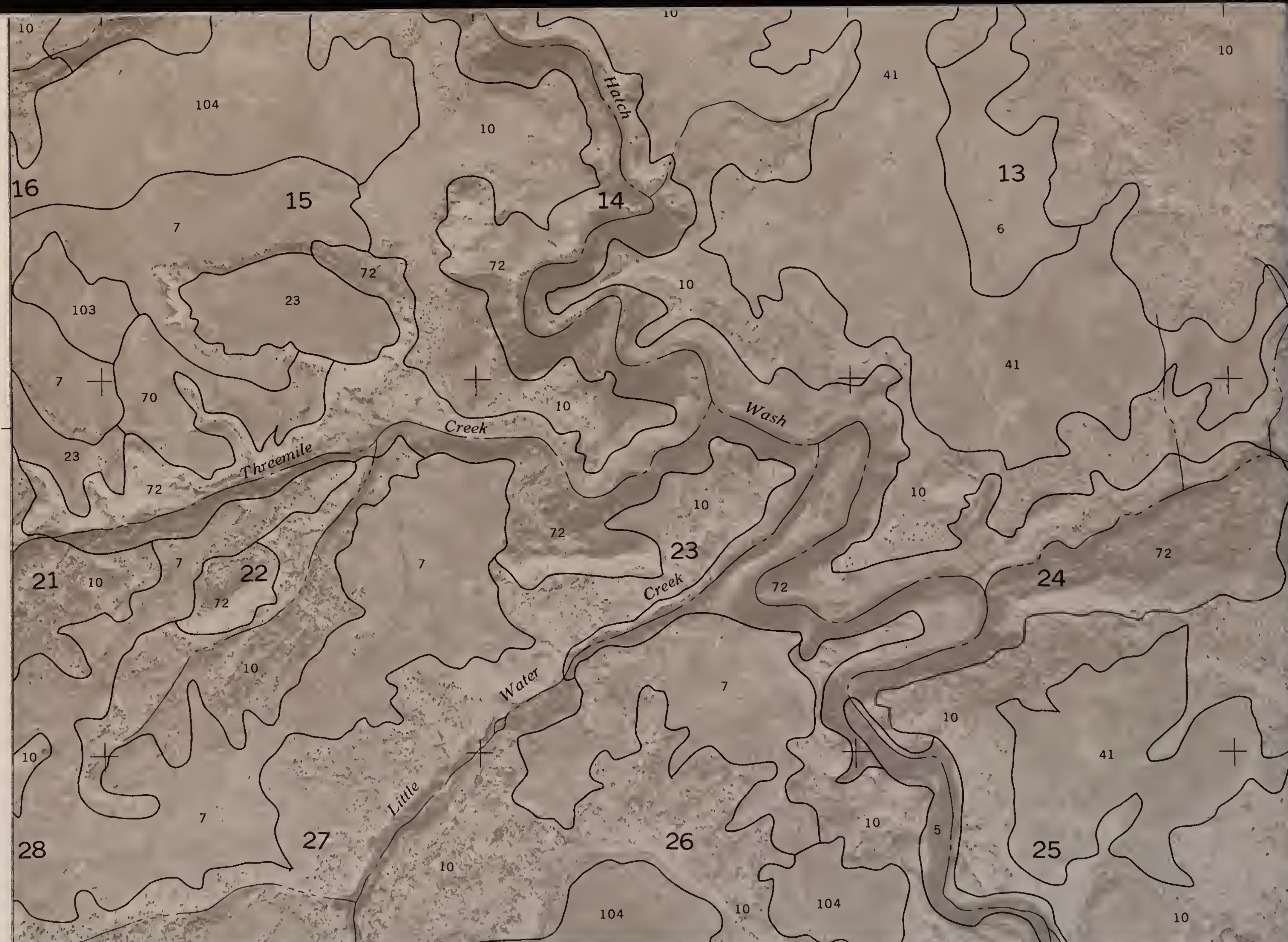
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 28

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





(Joins sheet 36)

R. 22 E. | R. 23 E

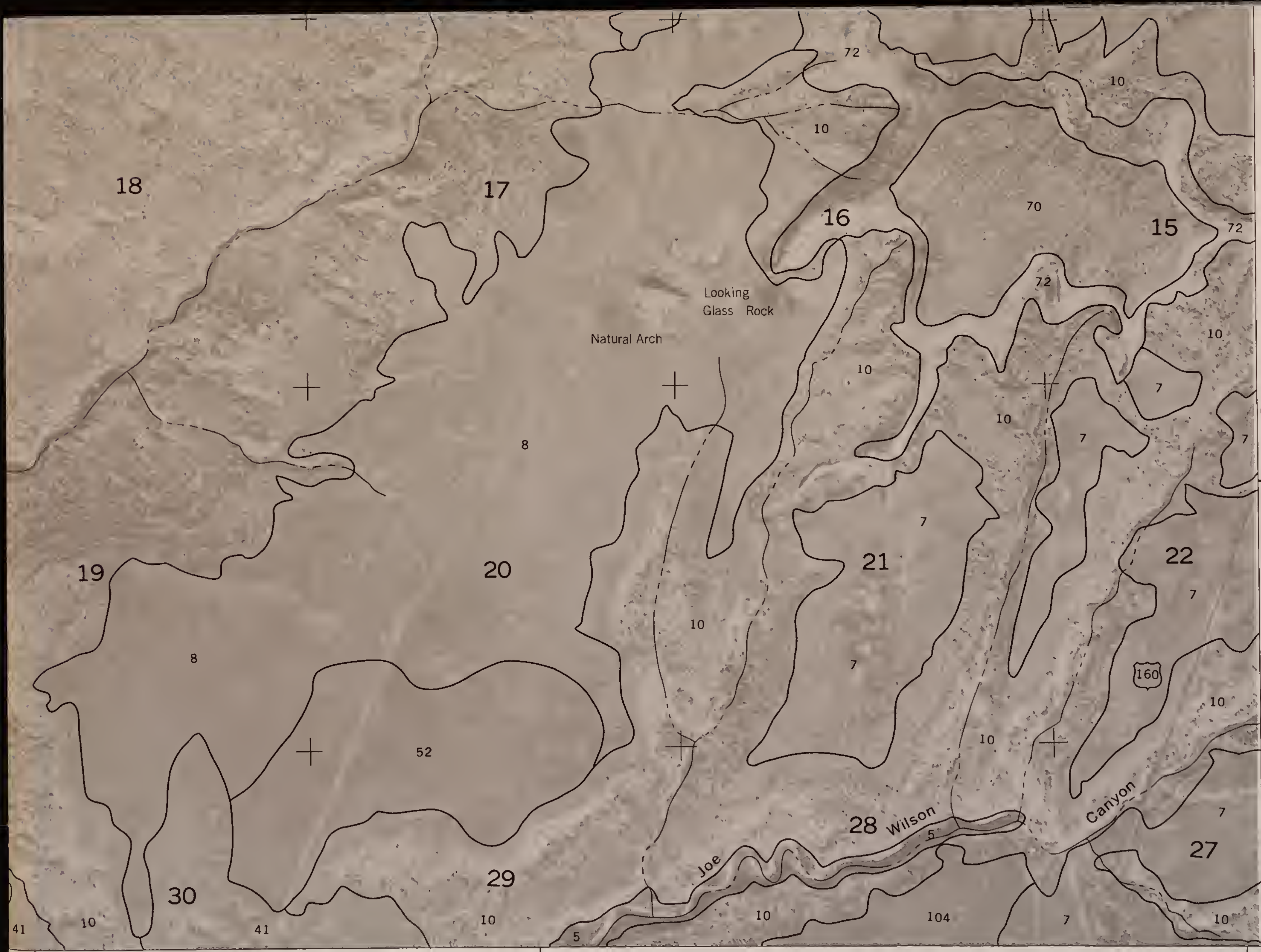
1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS OF



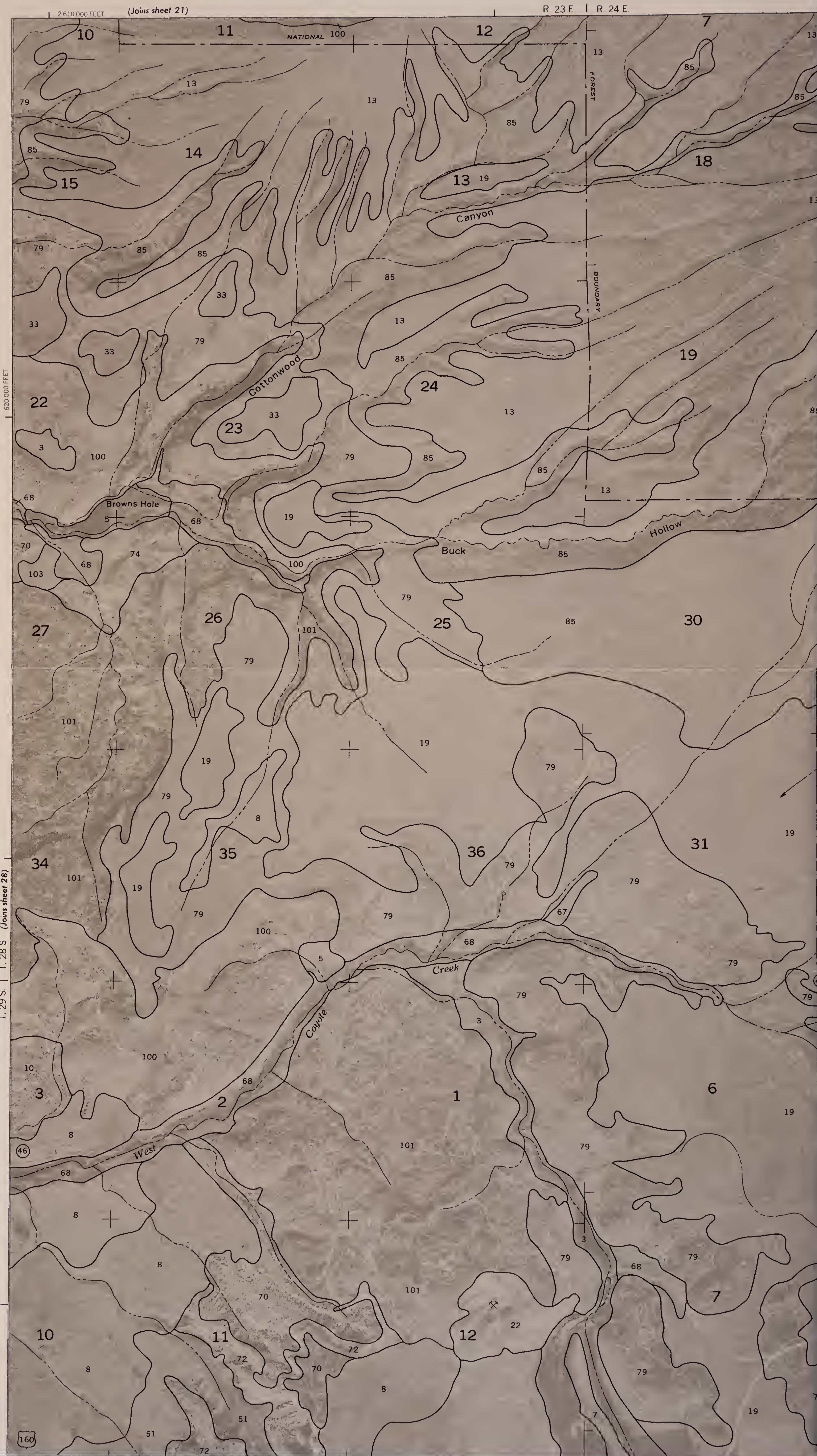
1
2 MILES
1
2 KILOMETERS
000

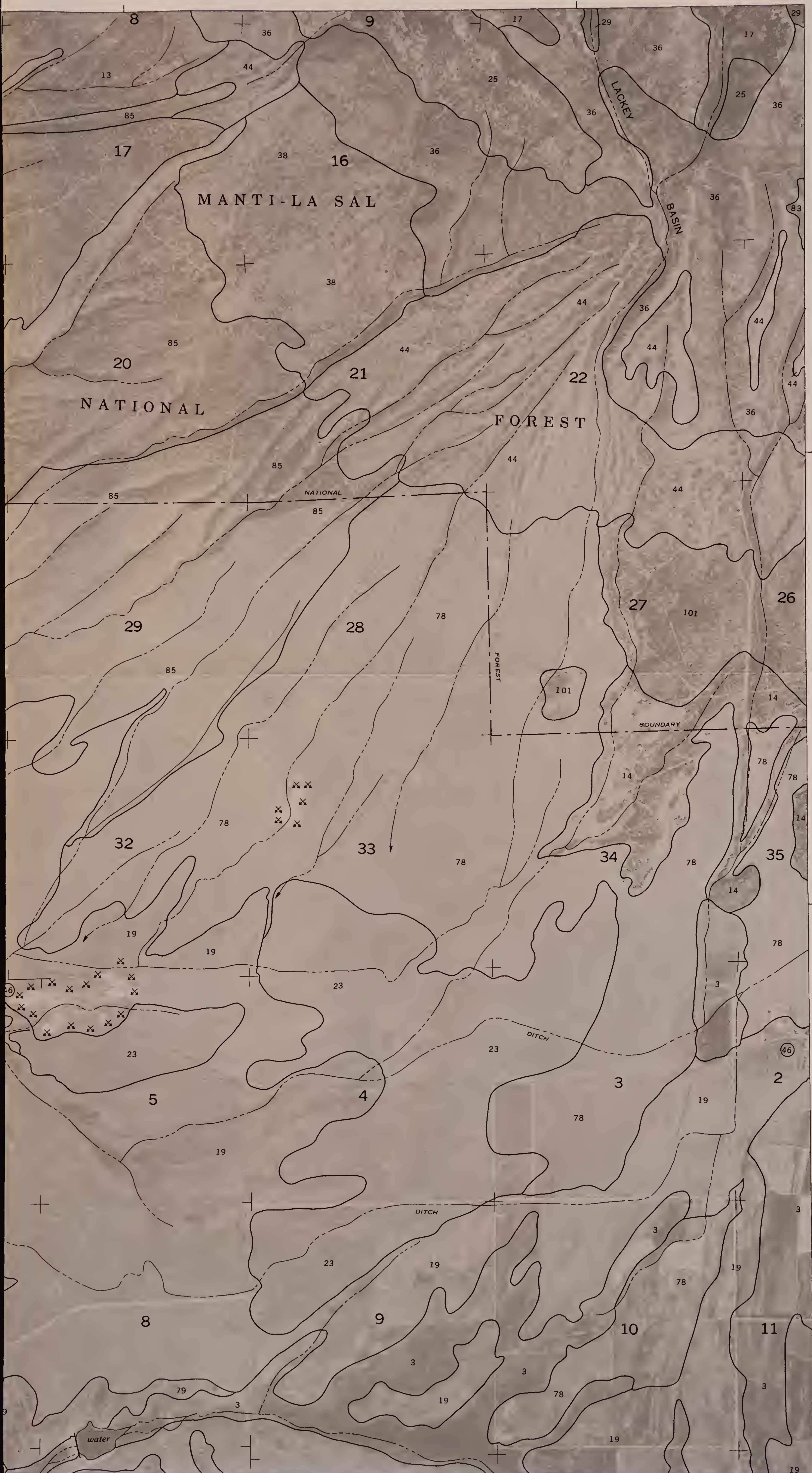
RAND AND SAN JUAN COUNTIES NO. 28

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE




MANTI-LA SAL
NATIONAL
FOREST
LACKEY
BASIN
NATIONAL
FOREST
BOUNDARY
DITCH
DITCH
water
(Joins sheet 30)
T. 29 S. | T. 28 S.
8
9
16
17
20
21
22
26
27
28
29
32
33
34
35
2
3
4
5
10
11

(Joins sheet 37)

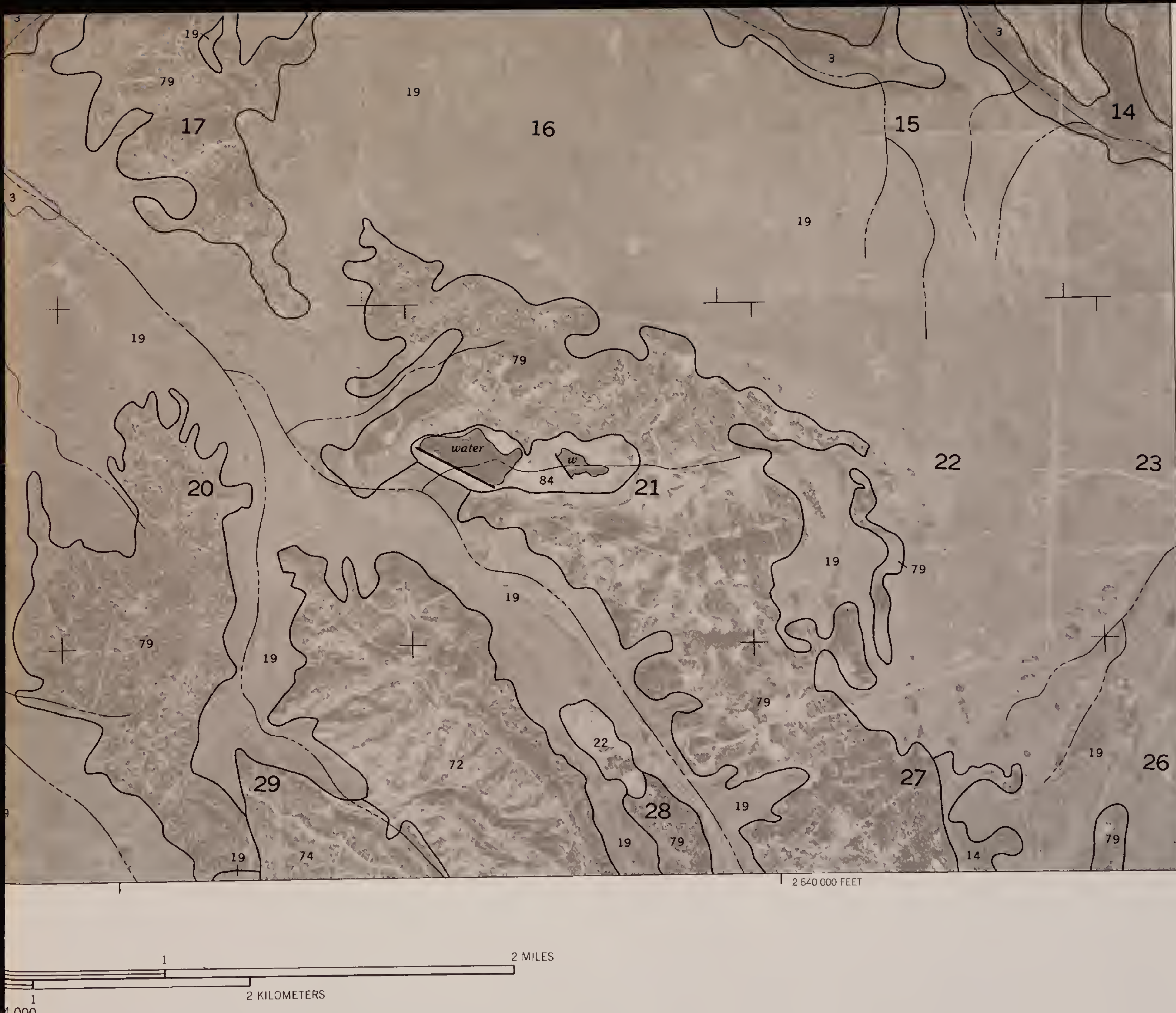
R. 23 E. | R. 24 E.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



19
79
17
19
16
3
3
15
14
3
19
19
79
water
w
84
20
21
22
23
590 000 FEET
19
79
19
79
19
79
22
72
29
28
27
19
26
19
79
74
19
19
14
79
2 640 000 FEET
1
2 MILES
1
2 KILOMETERS
4 000

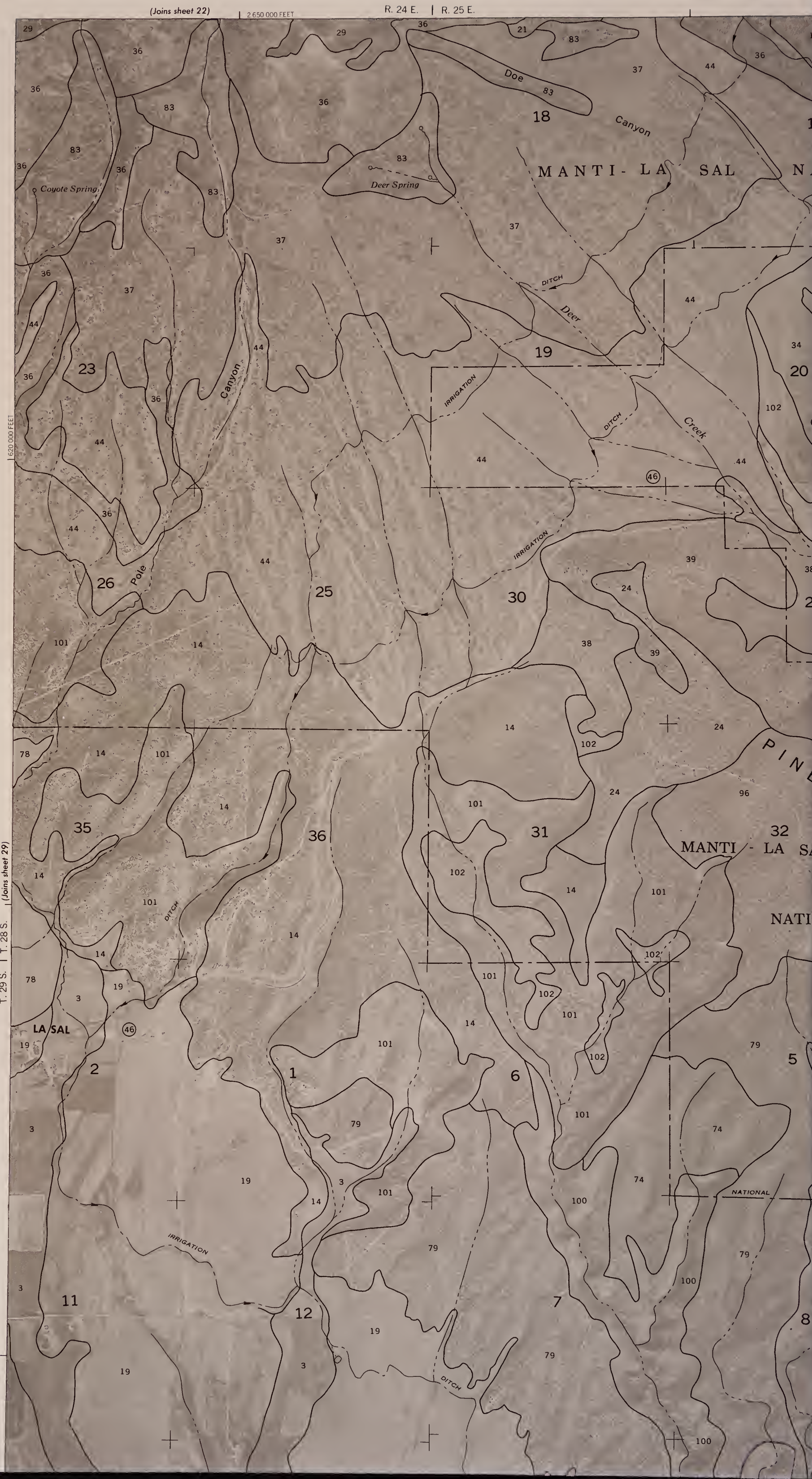
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

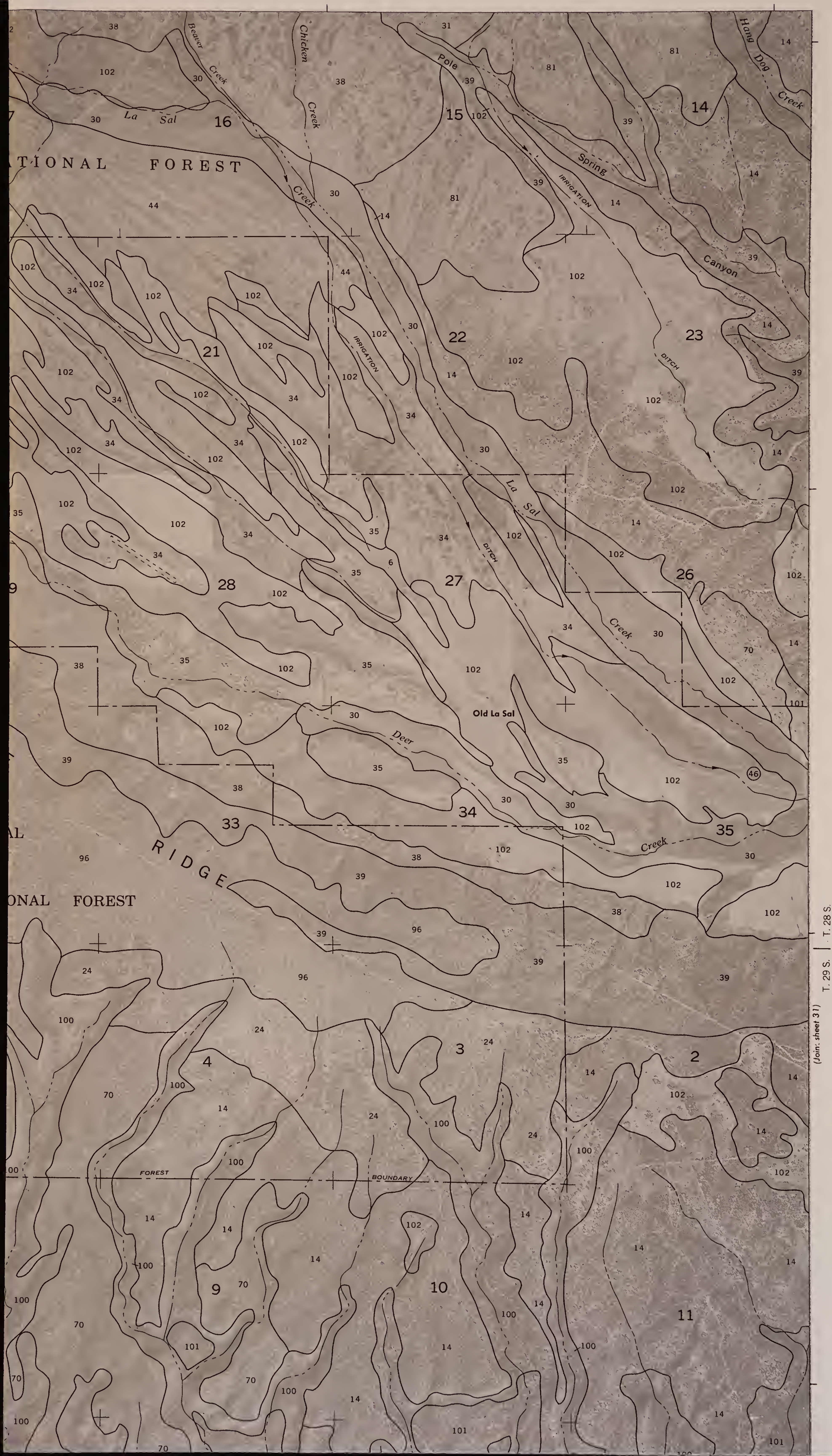
SHEET NO. 30
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

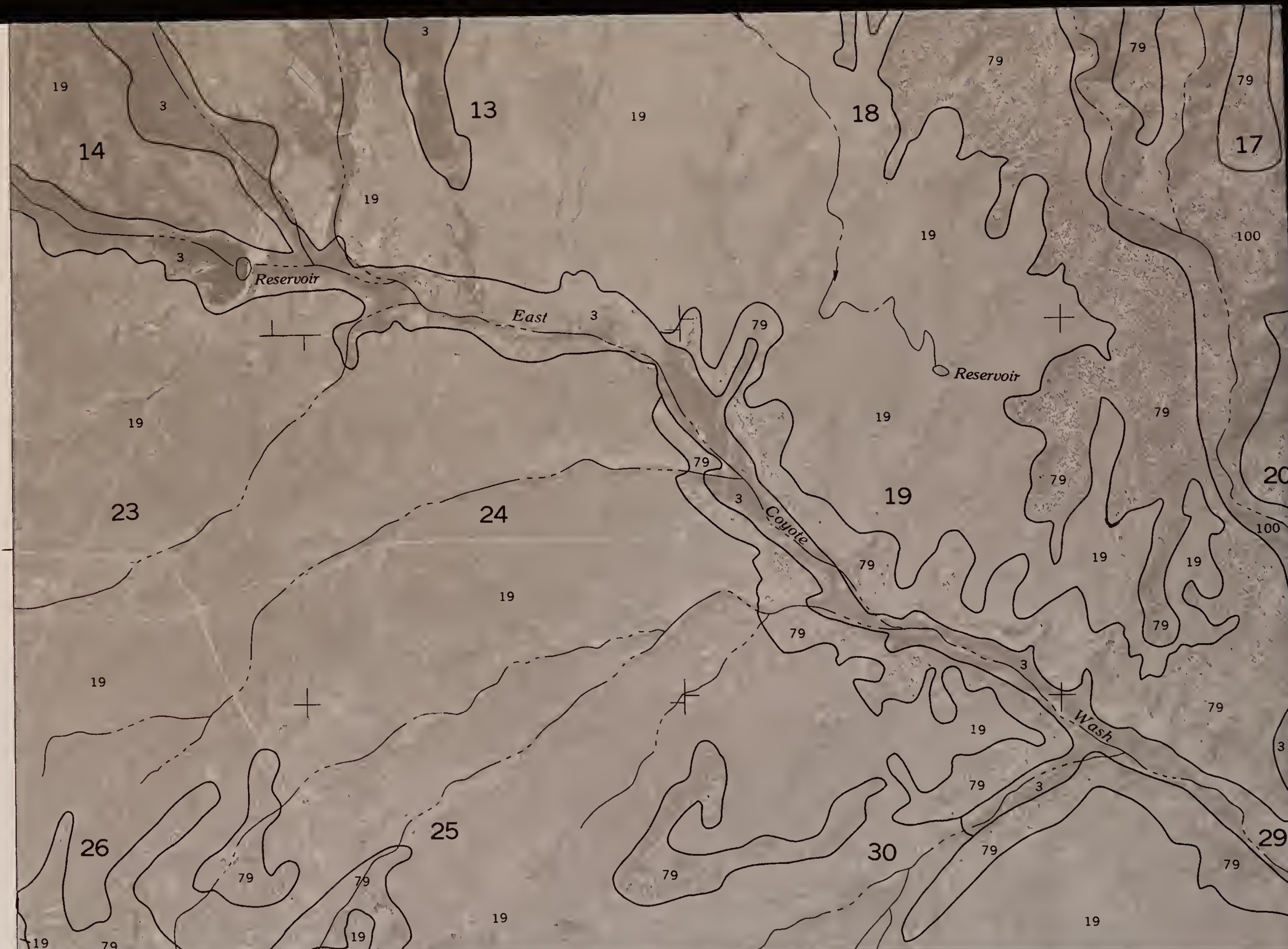
This soil survey map was compiled by the U S Department of Agriculture, Soil Conservation Service, and cooperating agencies Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography Coordinate grid ticks and land division corners, if shown, are approximately positioned

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE




NATIONAL FOREST
La Sal
Beaver Creek
Chicken Creek
Pole Spring Canyon
Hang Dog Creek
IRRIGATION DITCH
La Sal Creek
Old La Sal
Deer Creek
RIDGE
NATIONAL FOREST
FOREST BOUNDARY
(Join: sheet 31)
T. 28 S.
T. 29 S.



(Joins sheet 38)

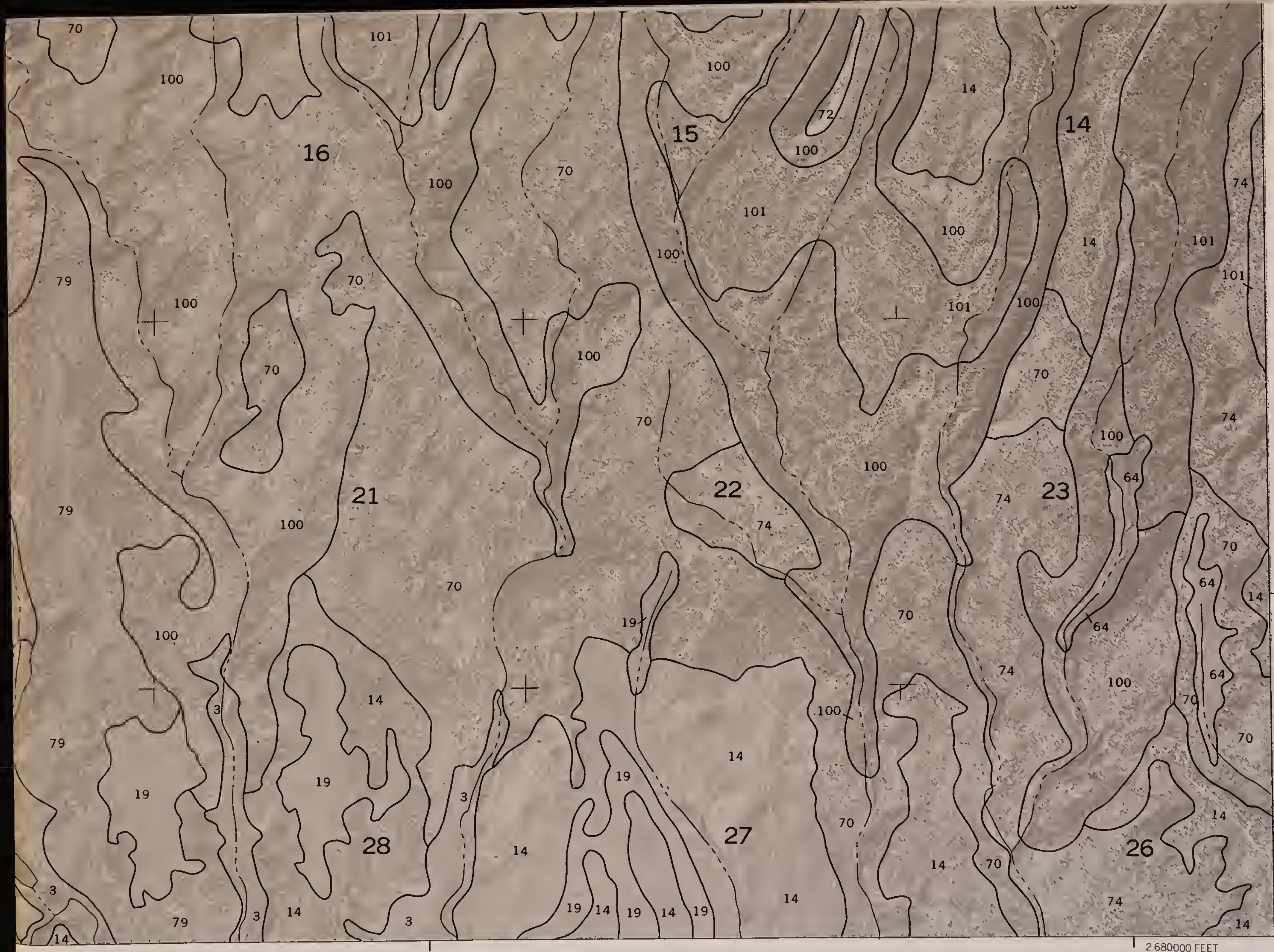
R. 24 E. | R. 25 E.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


16
15
14
21
22
23
28
27
26
590 000 FEET
2 680000 FEET

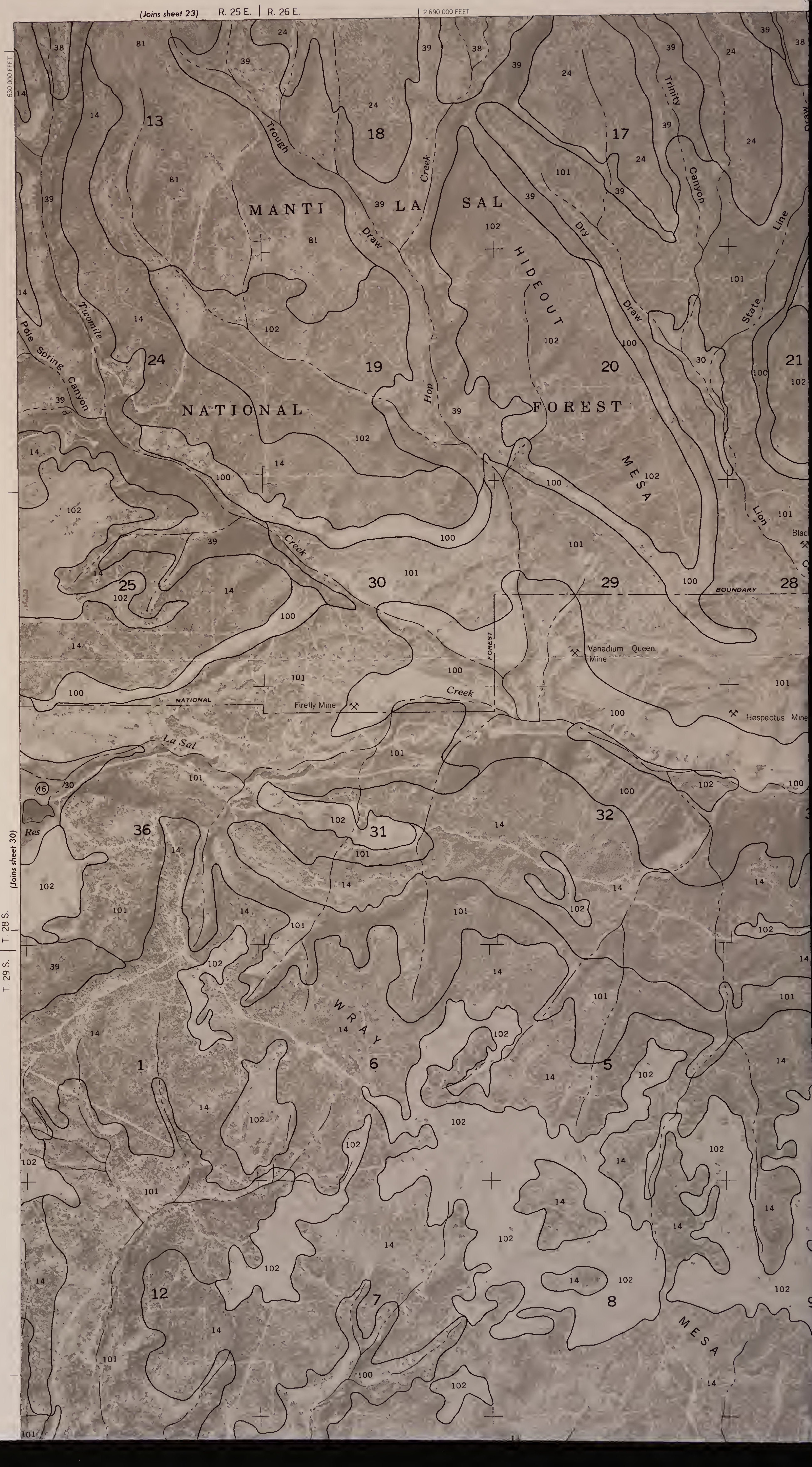

1
2 MILES
1
2 KILOMETERS
4 000

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

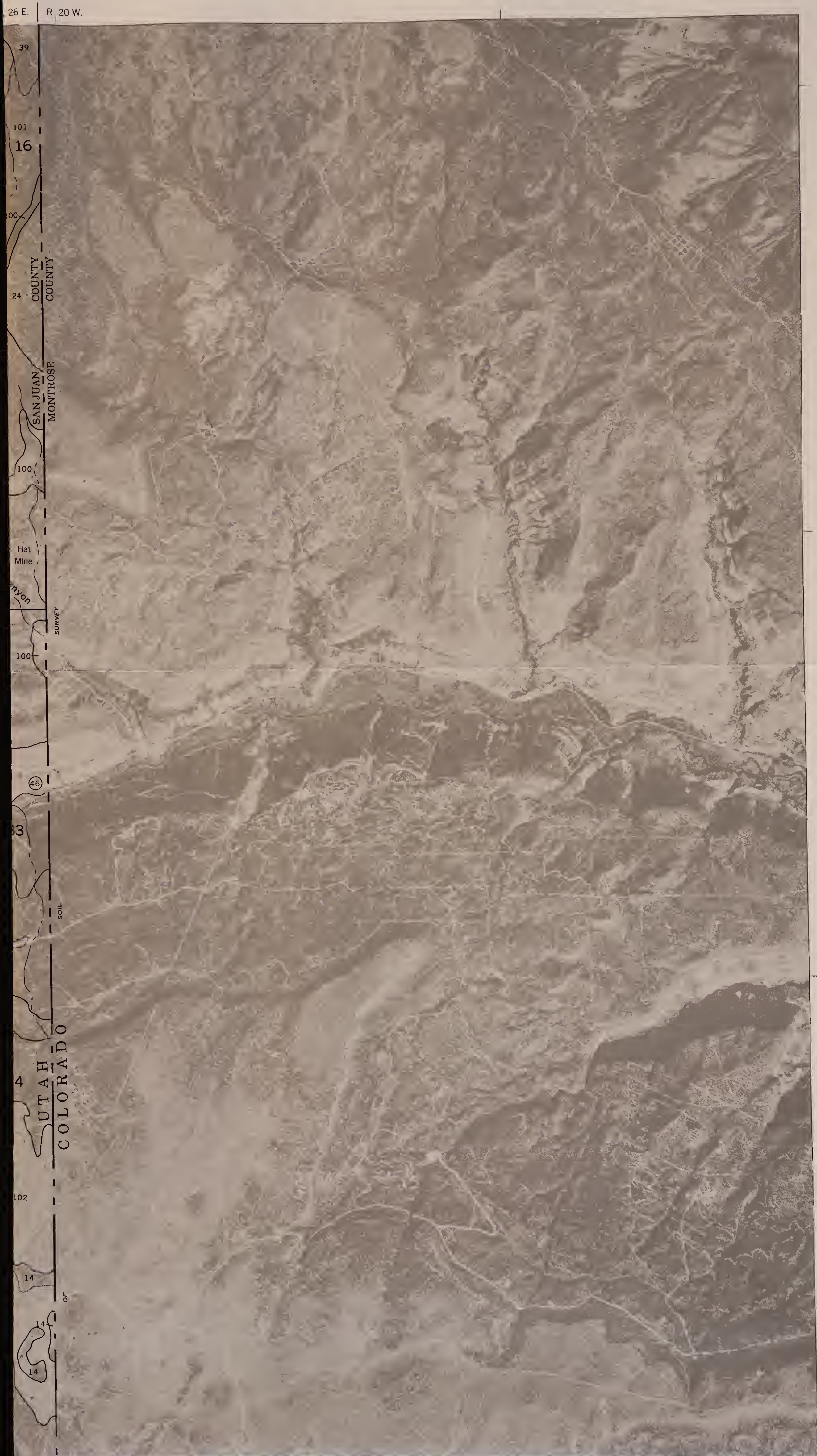
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

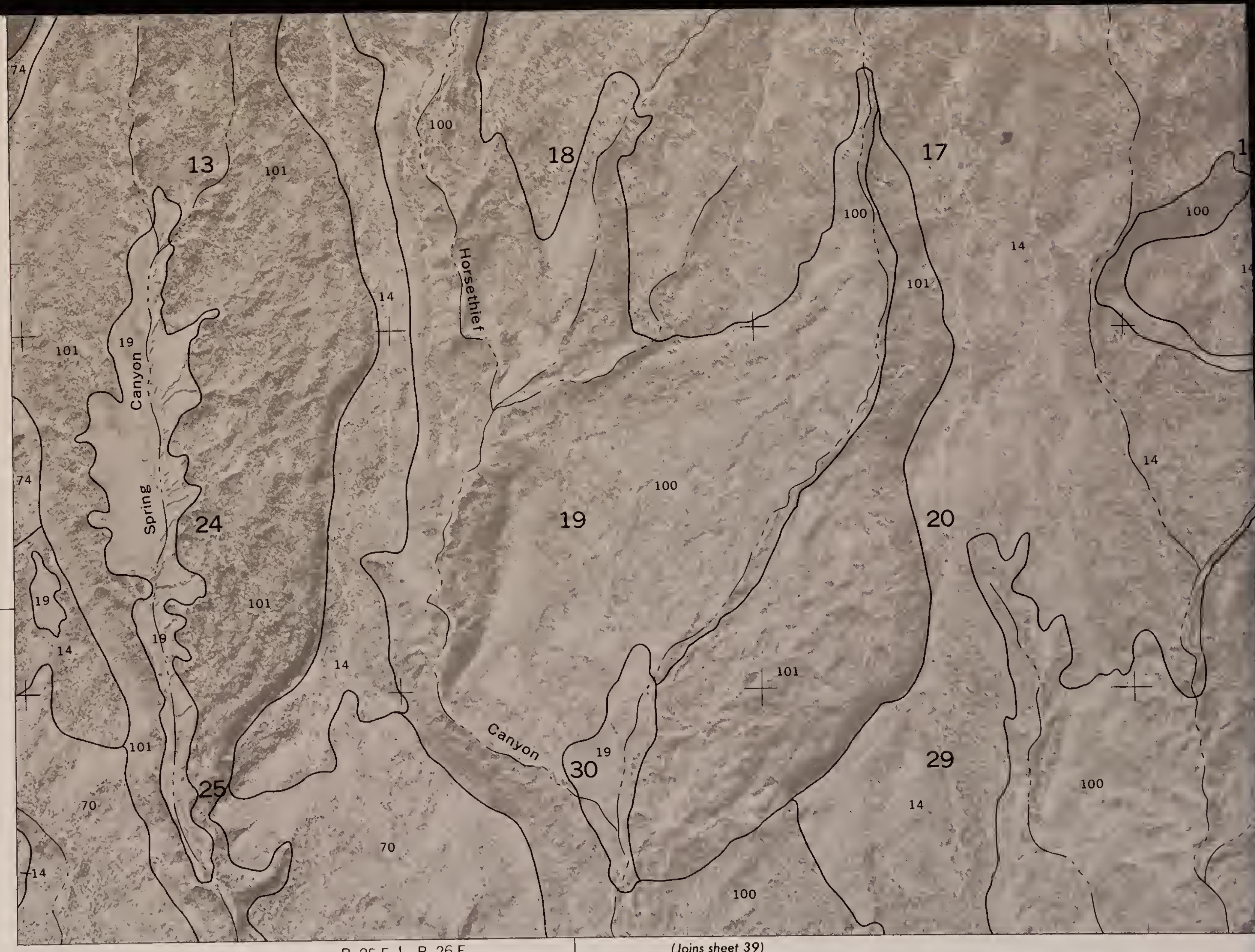
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

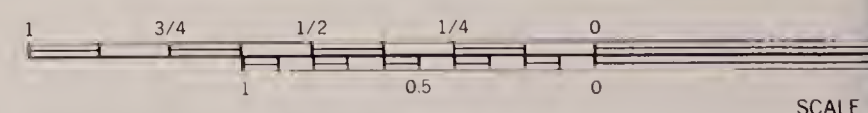


SHEET NO. 31

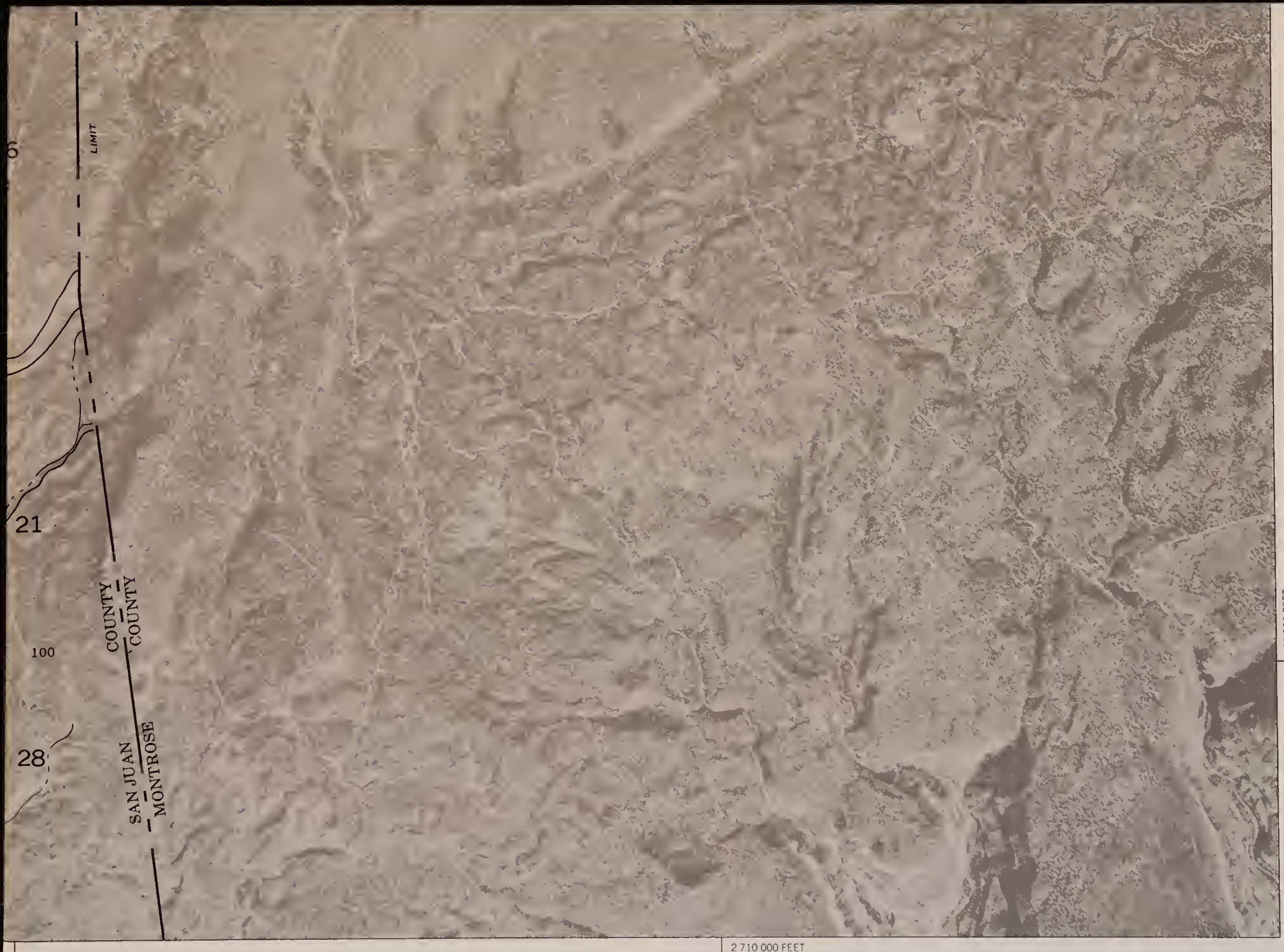
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES







This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

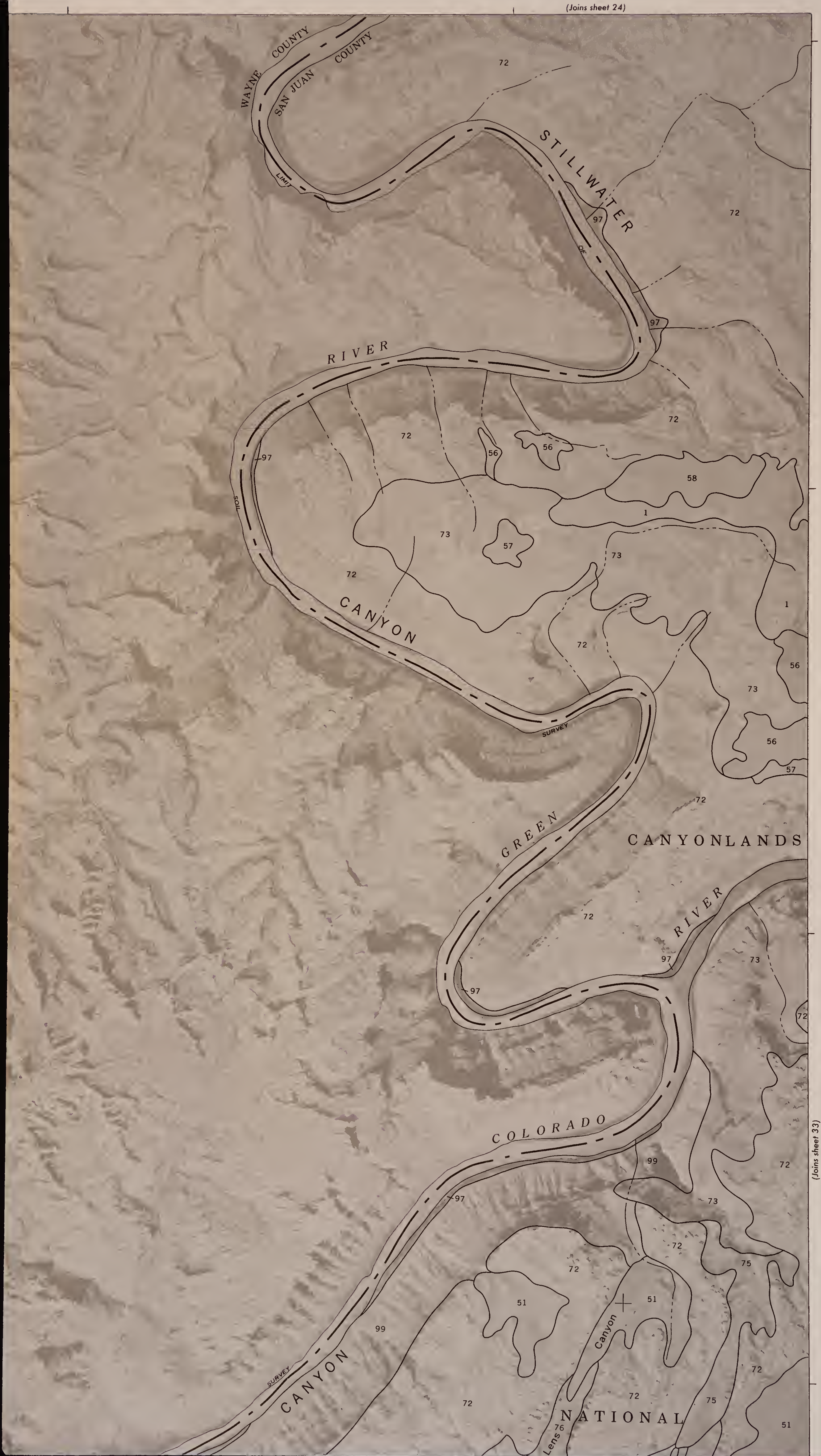
1 2 KILOMETERS

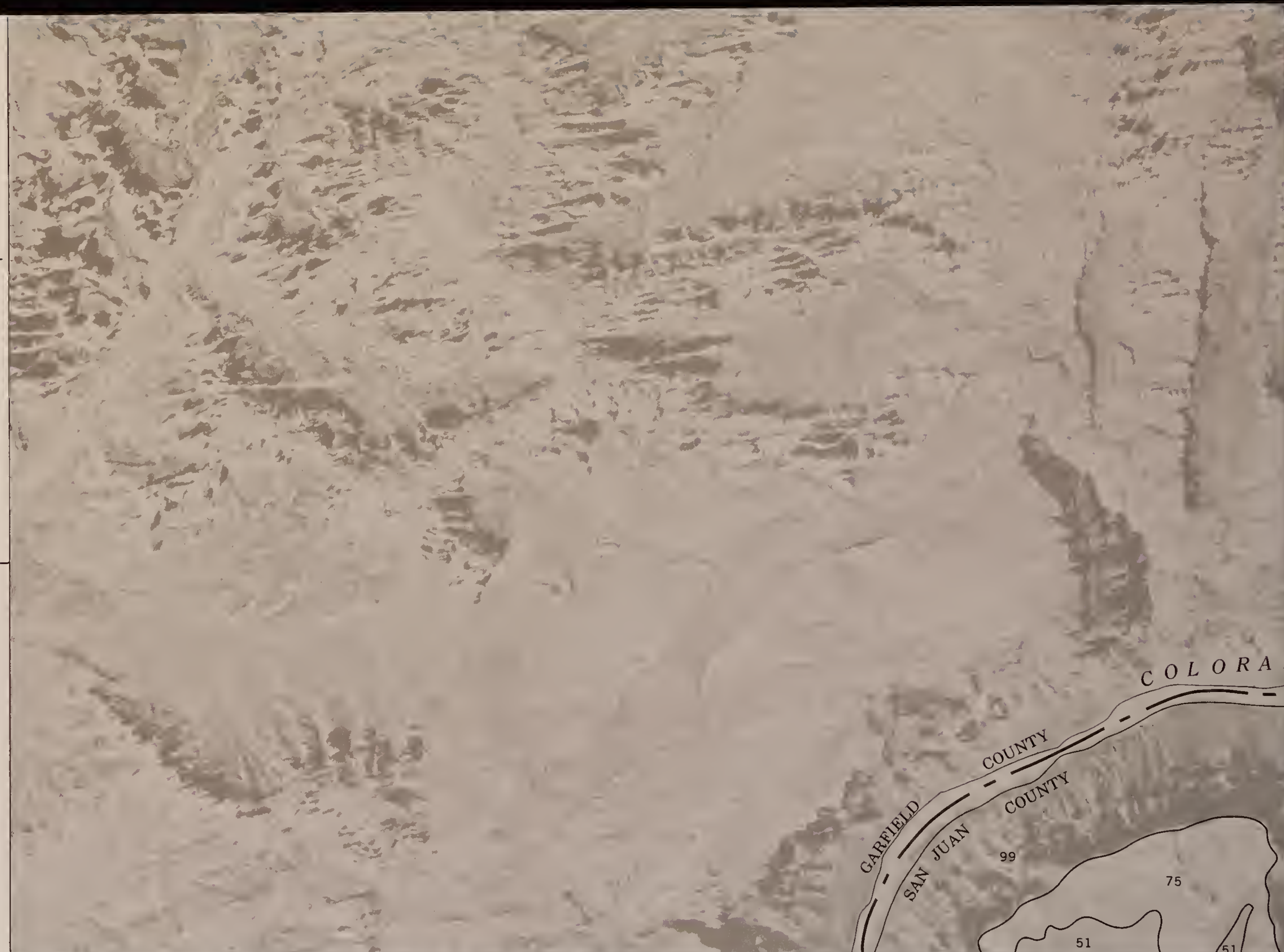
24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 32
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



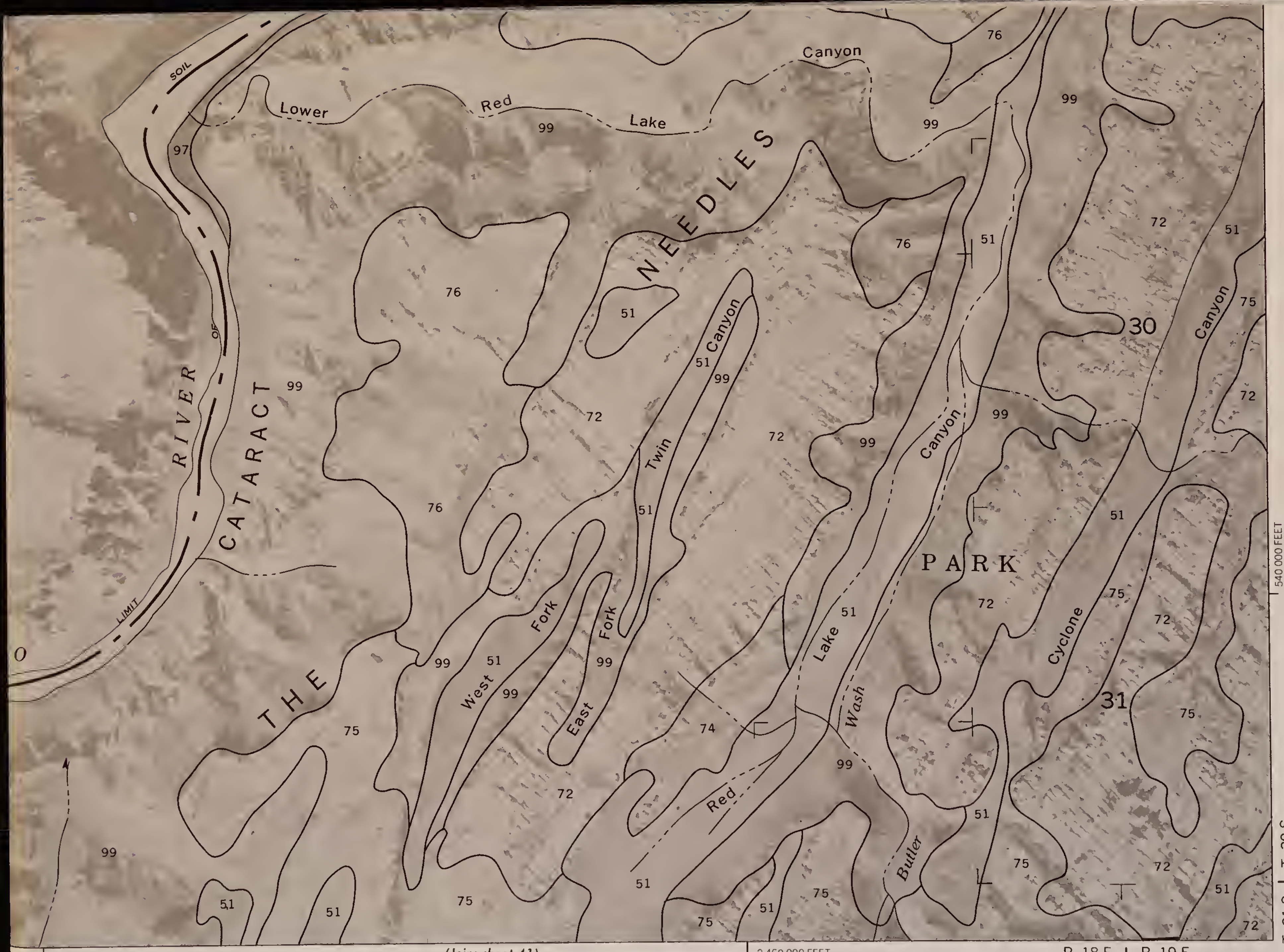


1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

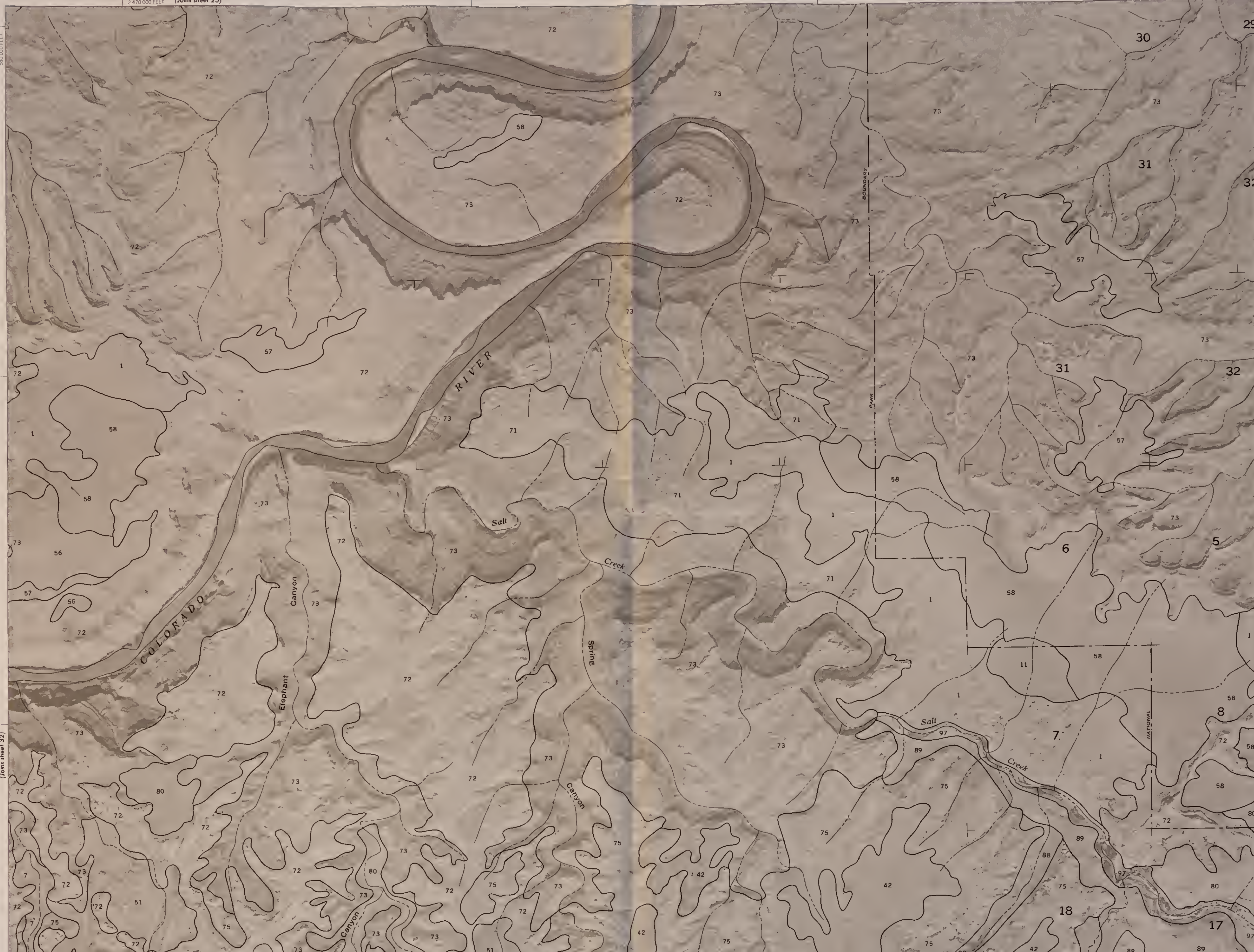
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

1 2 KILOMETERS

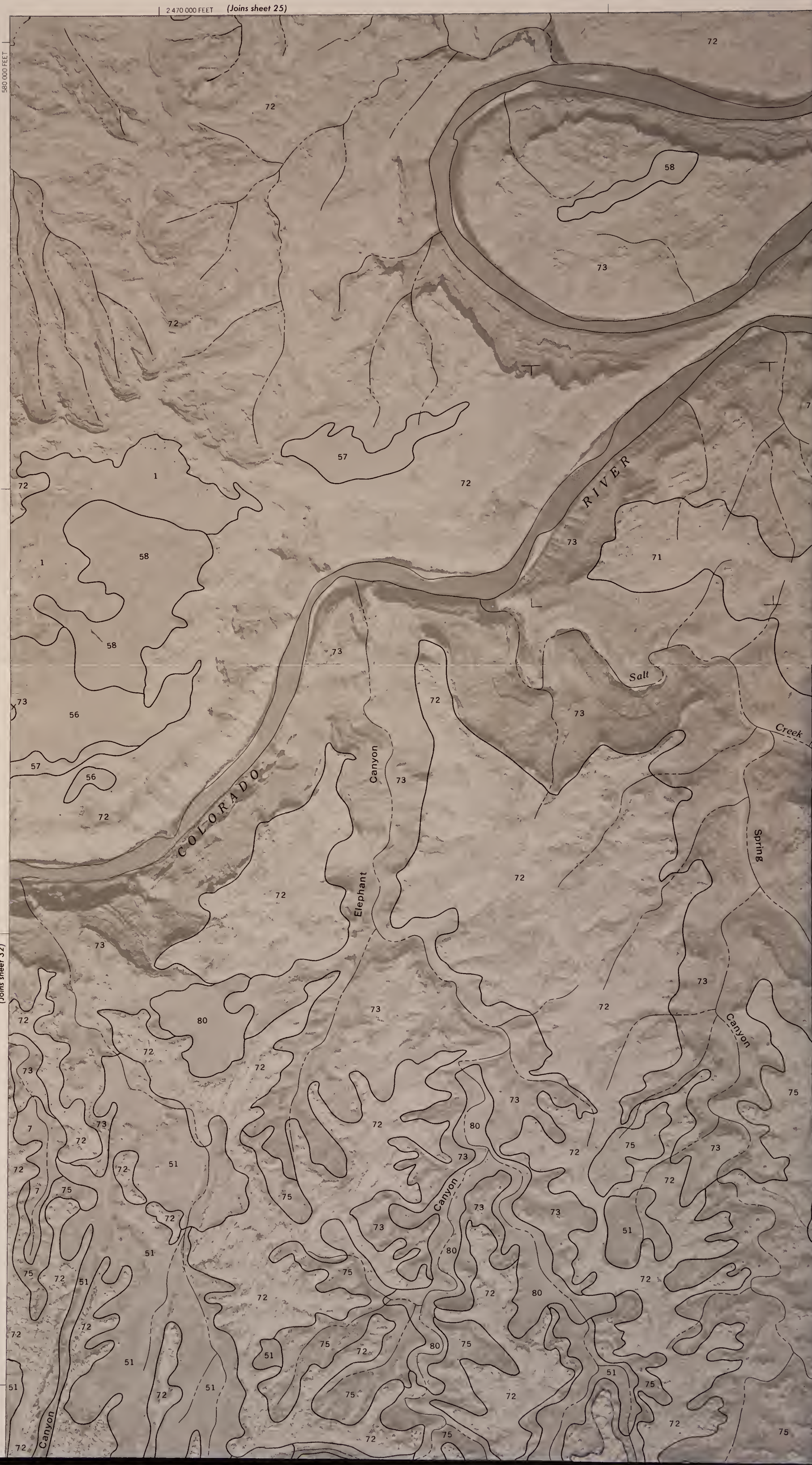
4 000



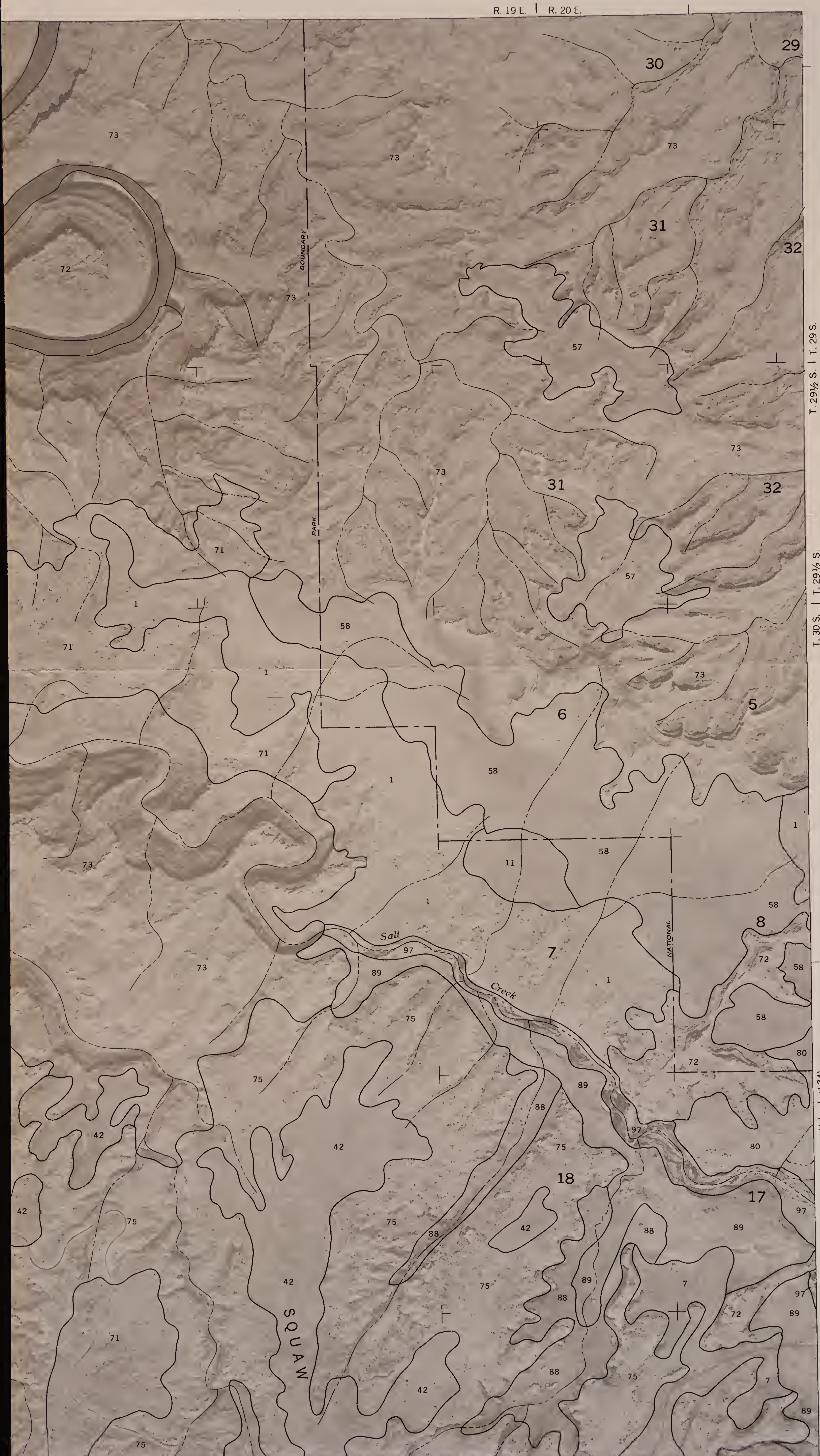
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

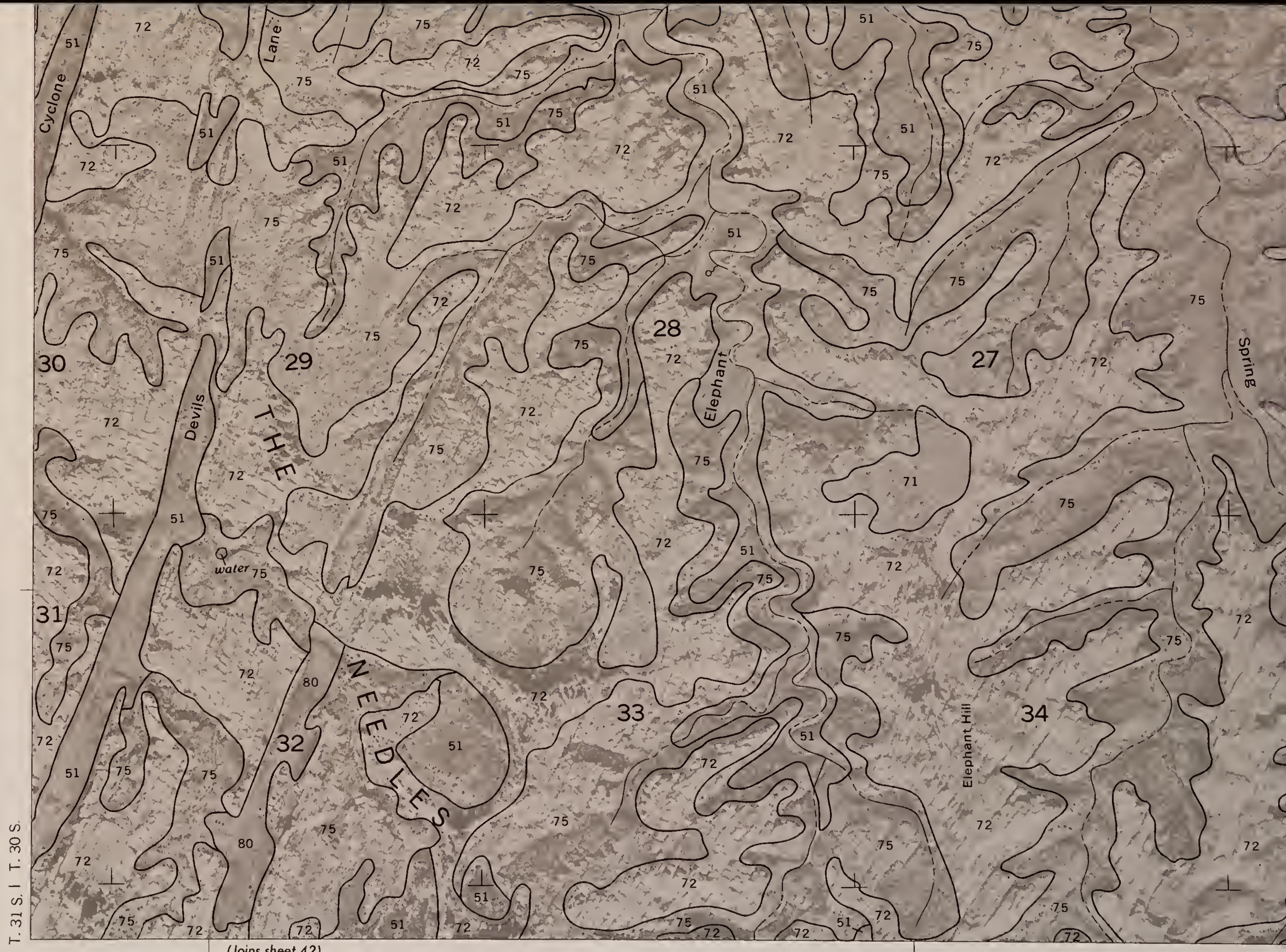
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

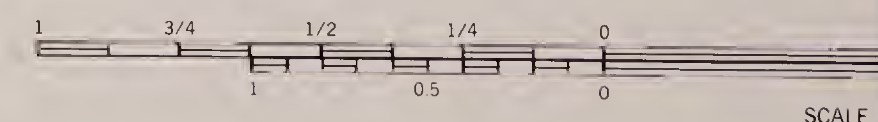
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



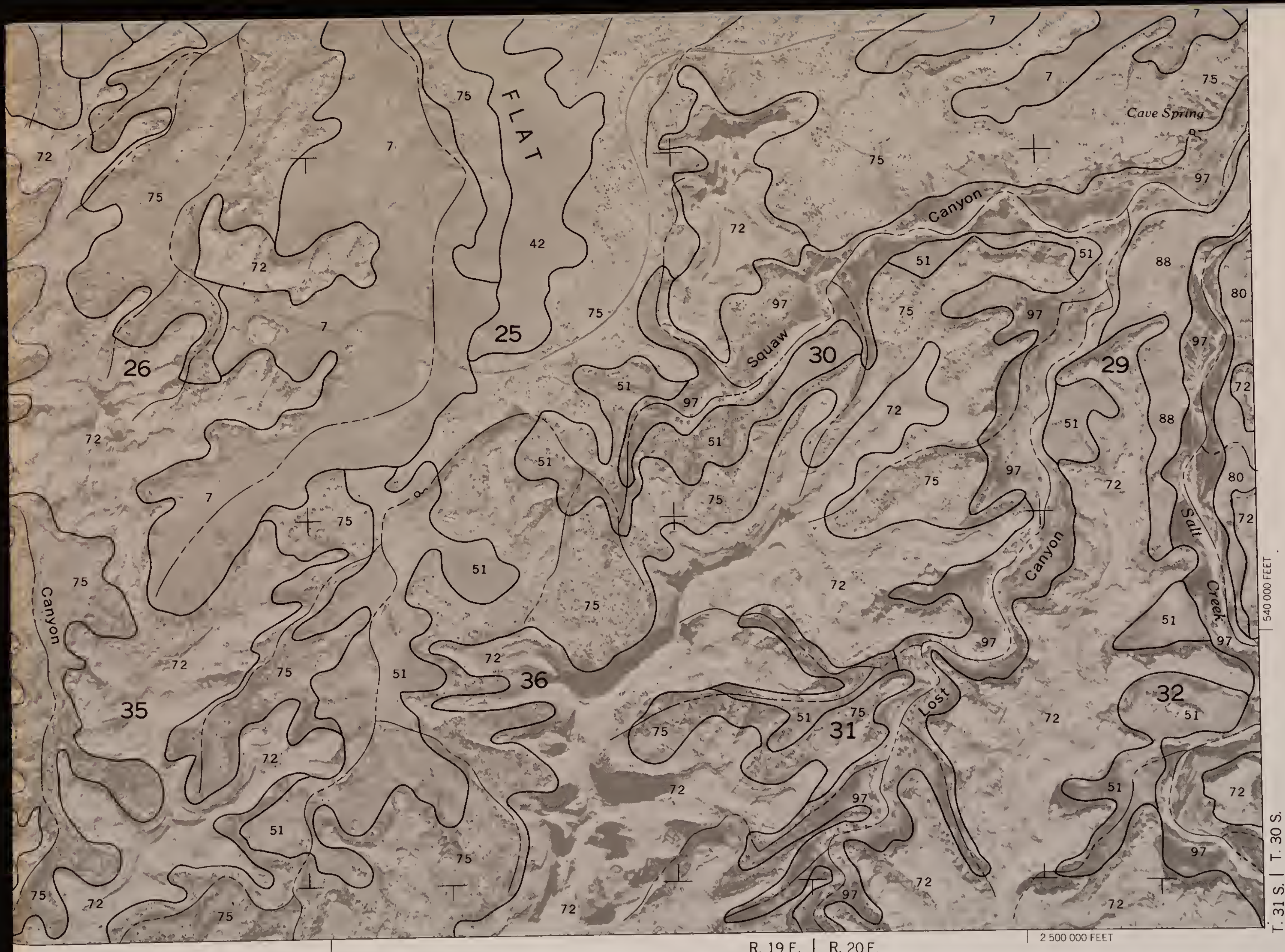
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES







This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

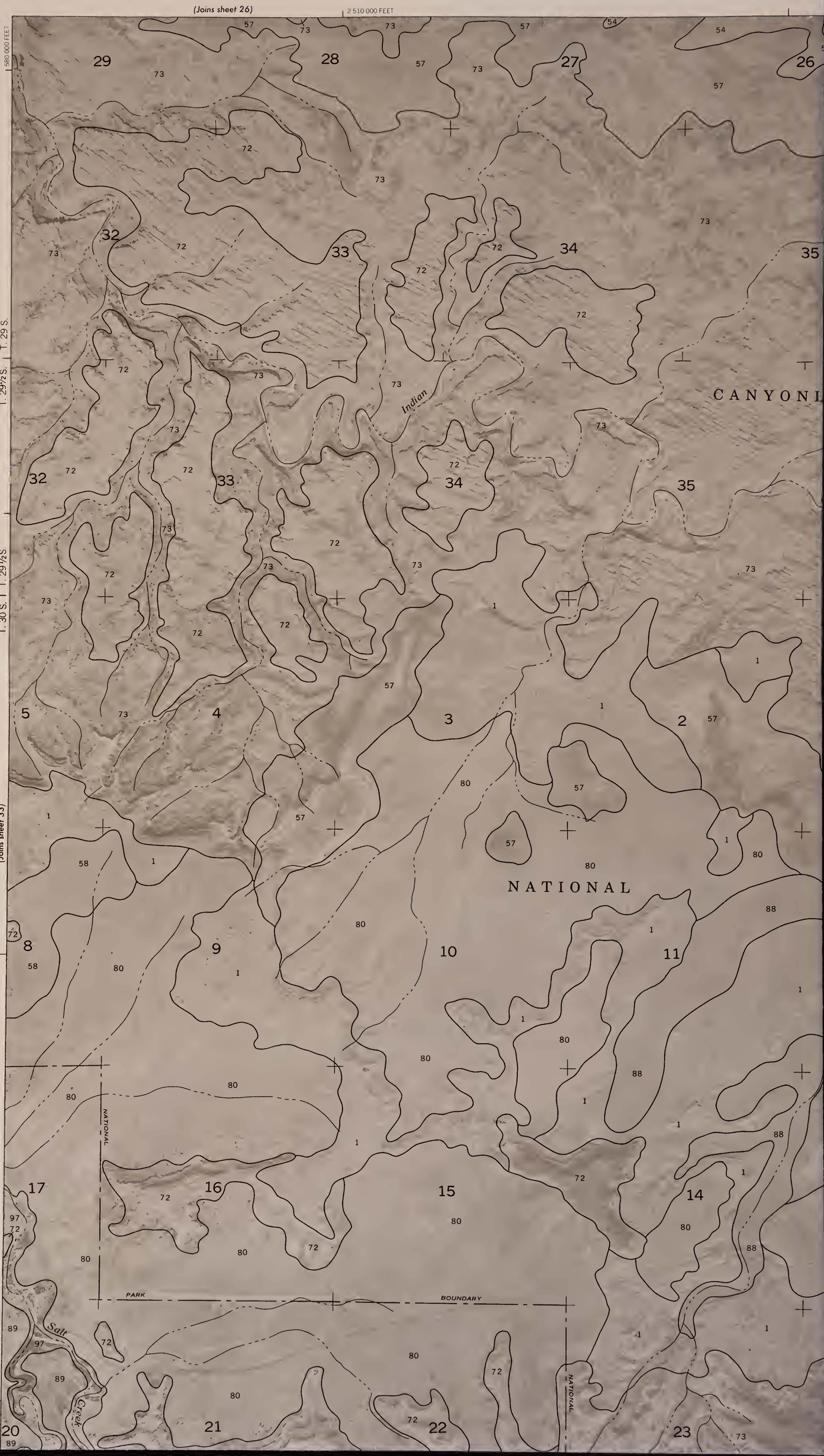


1
2 MILES
1
2 KILOMETERS
:4 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

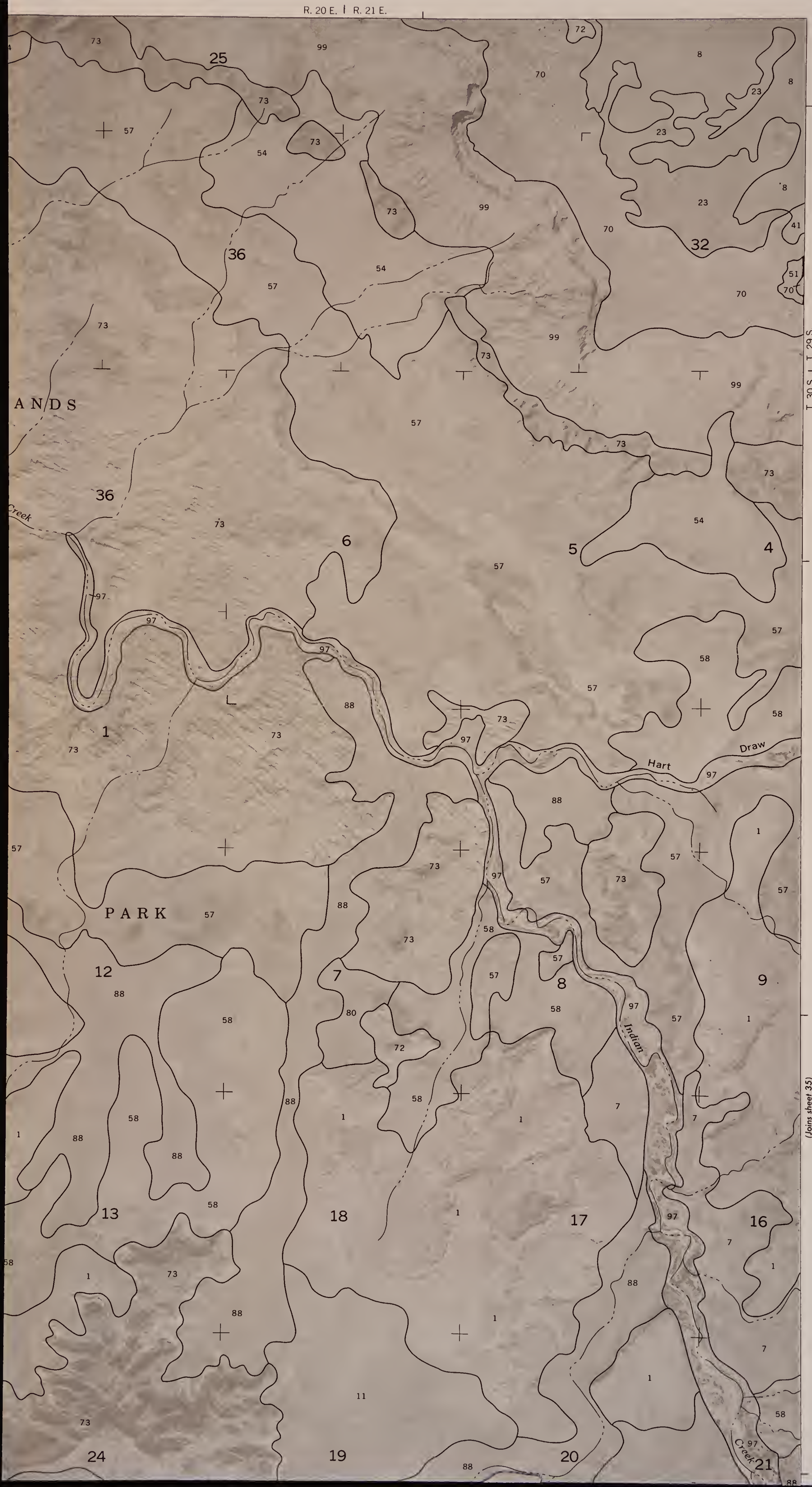
SCALE 1:24 000

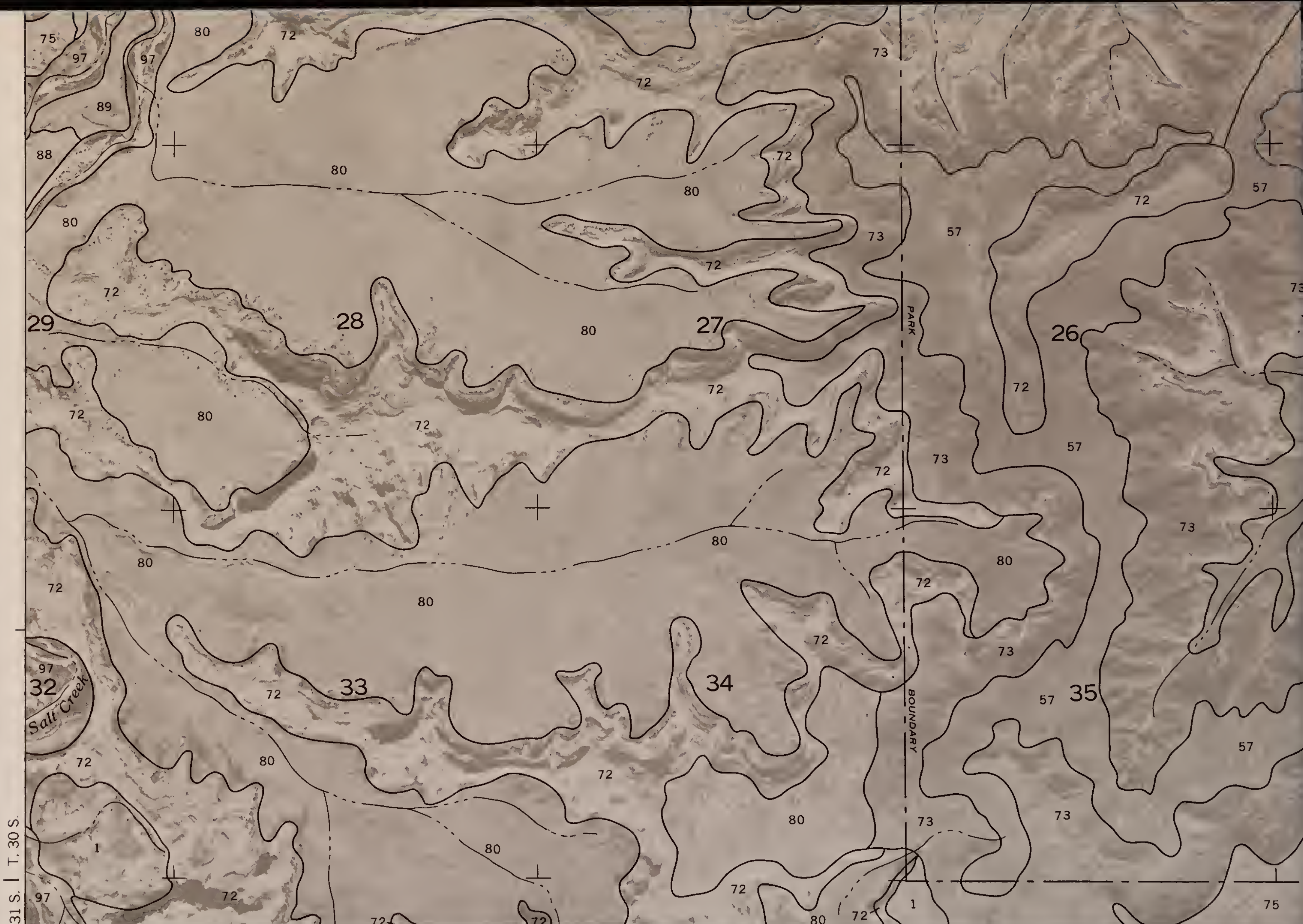
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 34

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





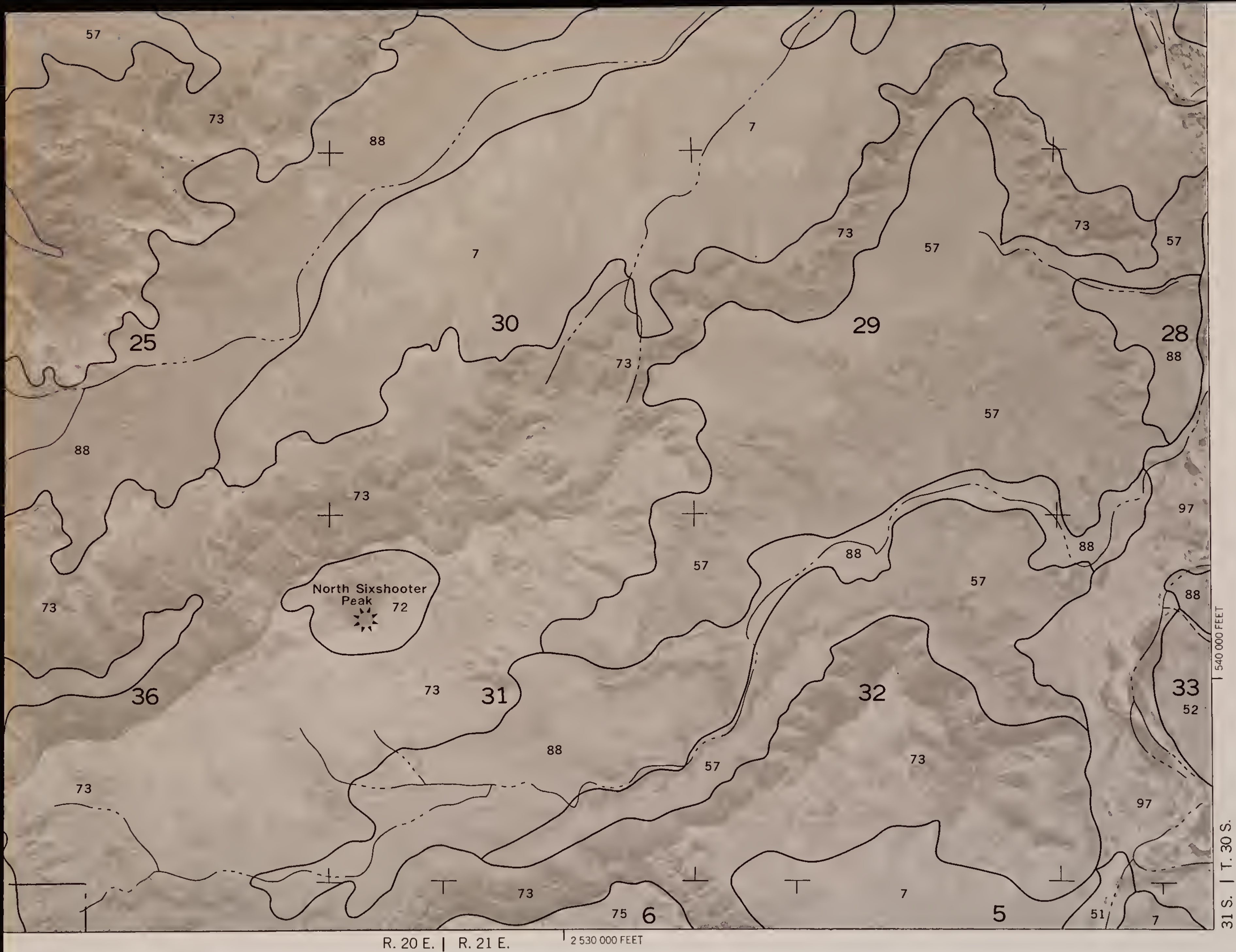
(Joins sheet 43)

1 3/4 1/2 1/4 0

1 0.5 0 1

SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


North Sixshooter Peak
25
30
29
28
36
31
32
33
6
5
R. 20 E. | R. 21 E.
2 530 000 FEET
540 000 FEET
31 S. | T. 30 S.


1
2 MILES
2 KILOMETERS

SCALE 1:24 000

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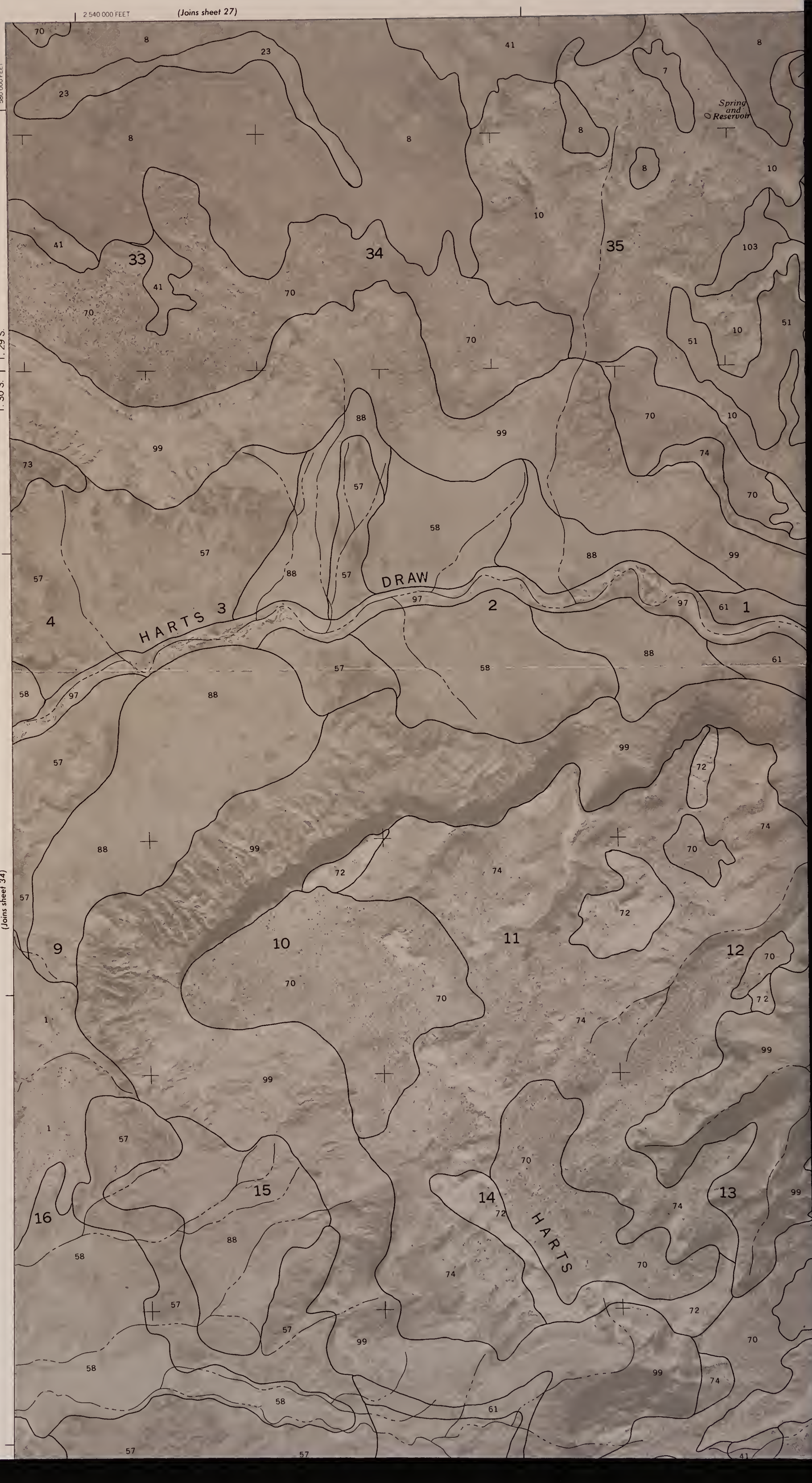
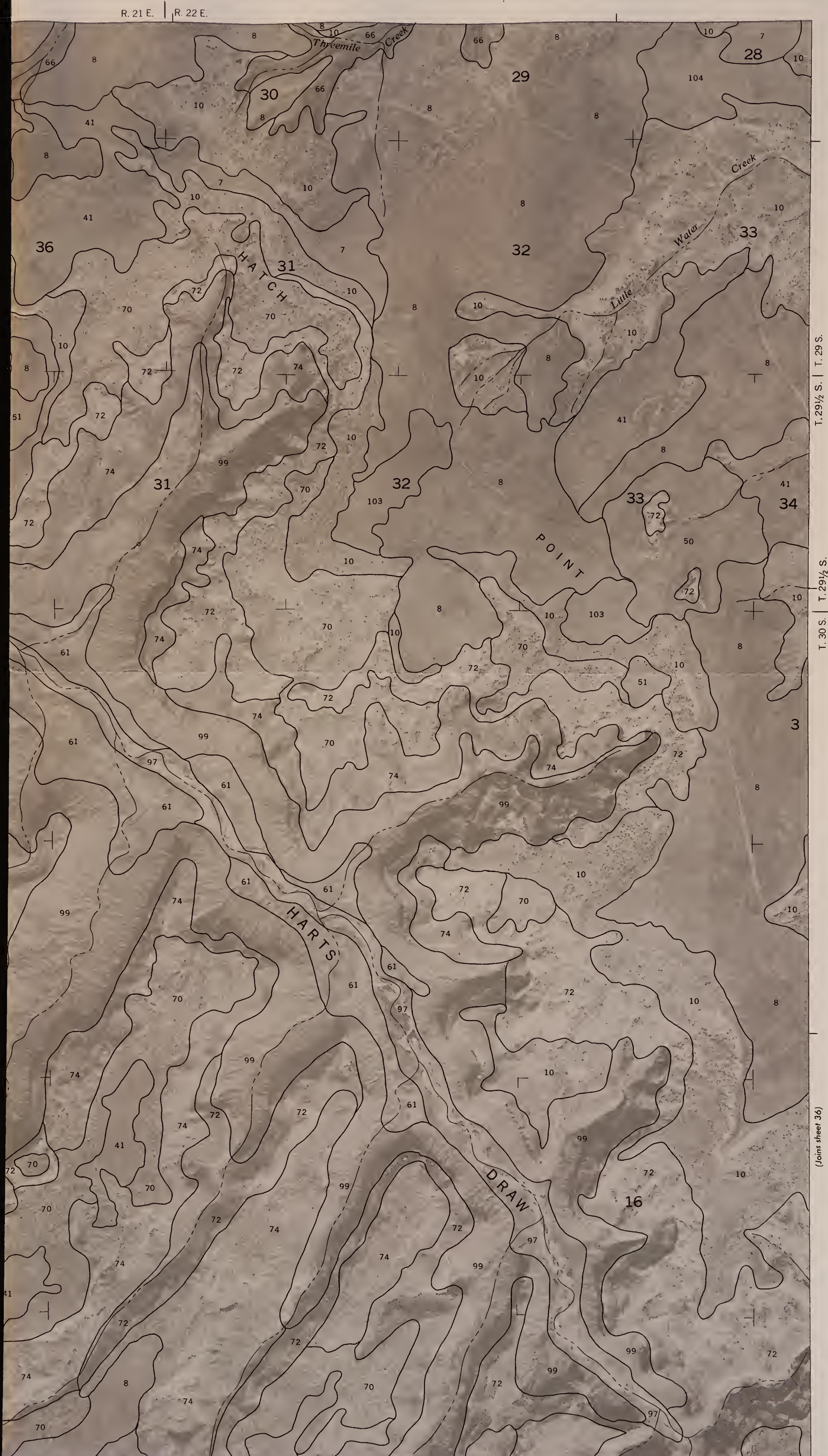
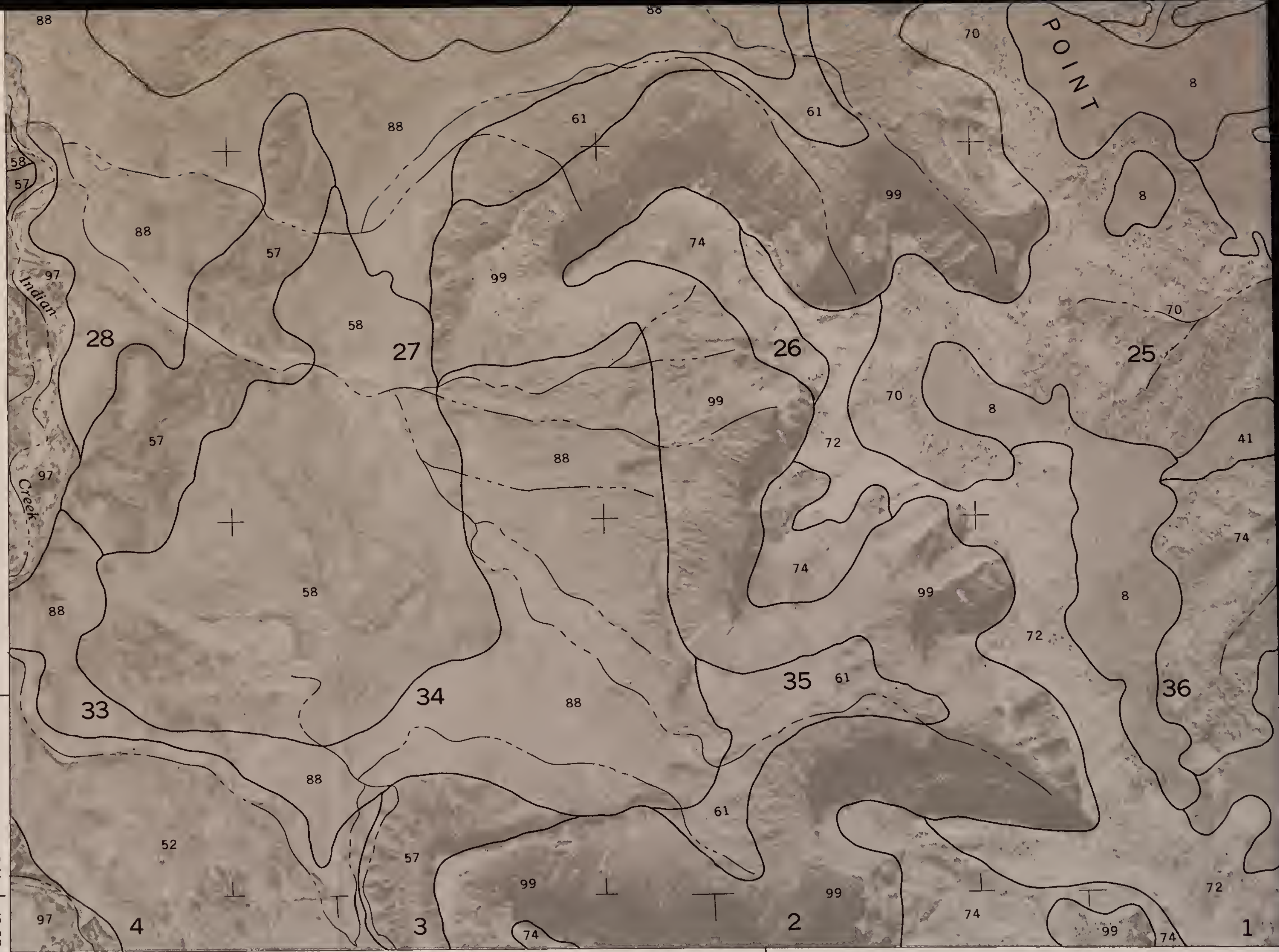
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 35
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





T. 31 S. | T. 30 S.

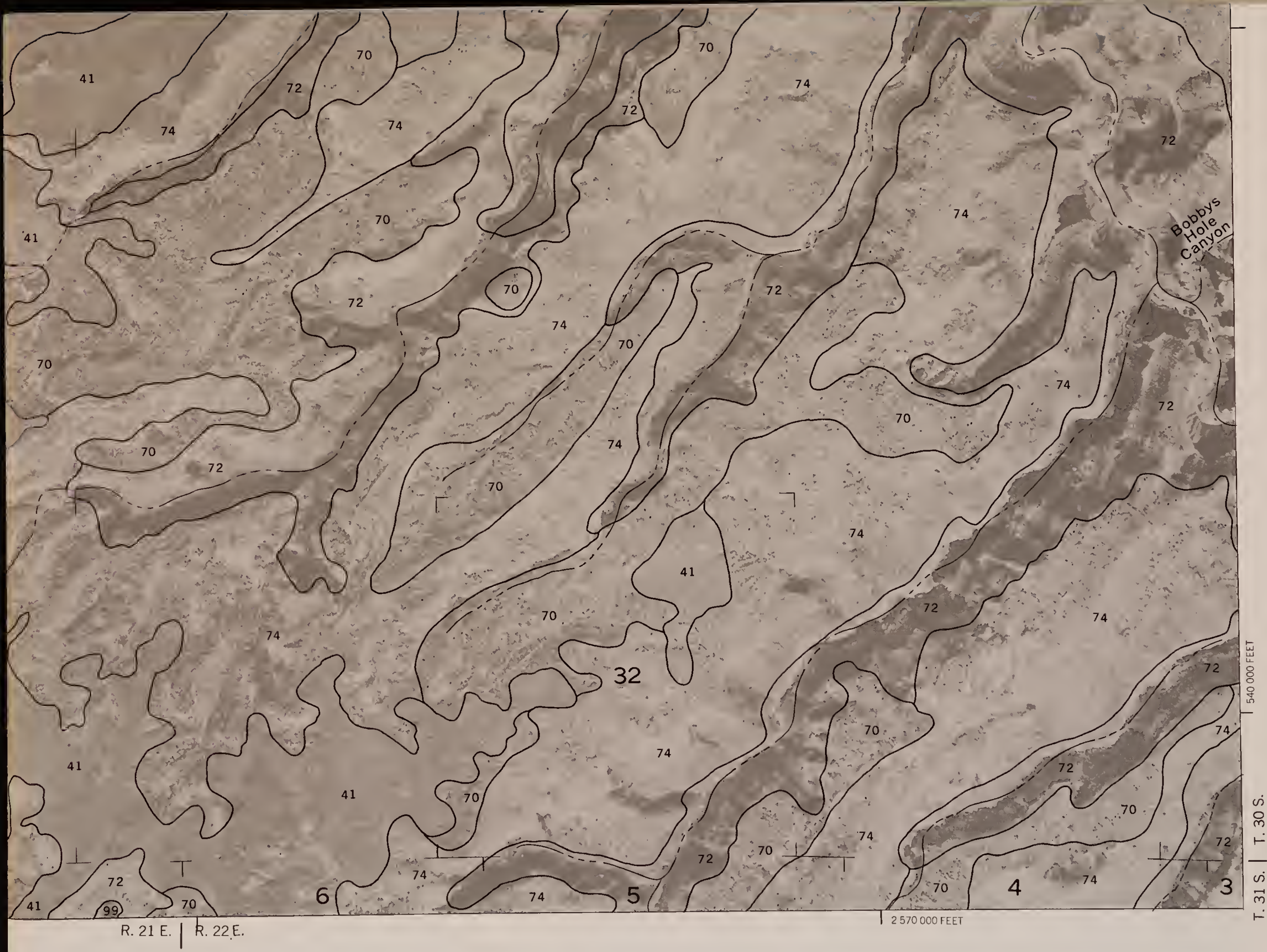
(Joins sheet 44)

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

1 2 KILOMETERS

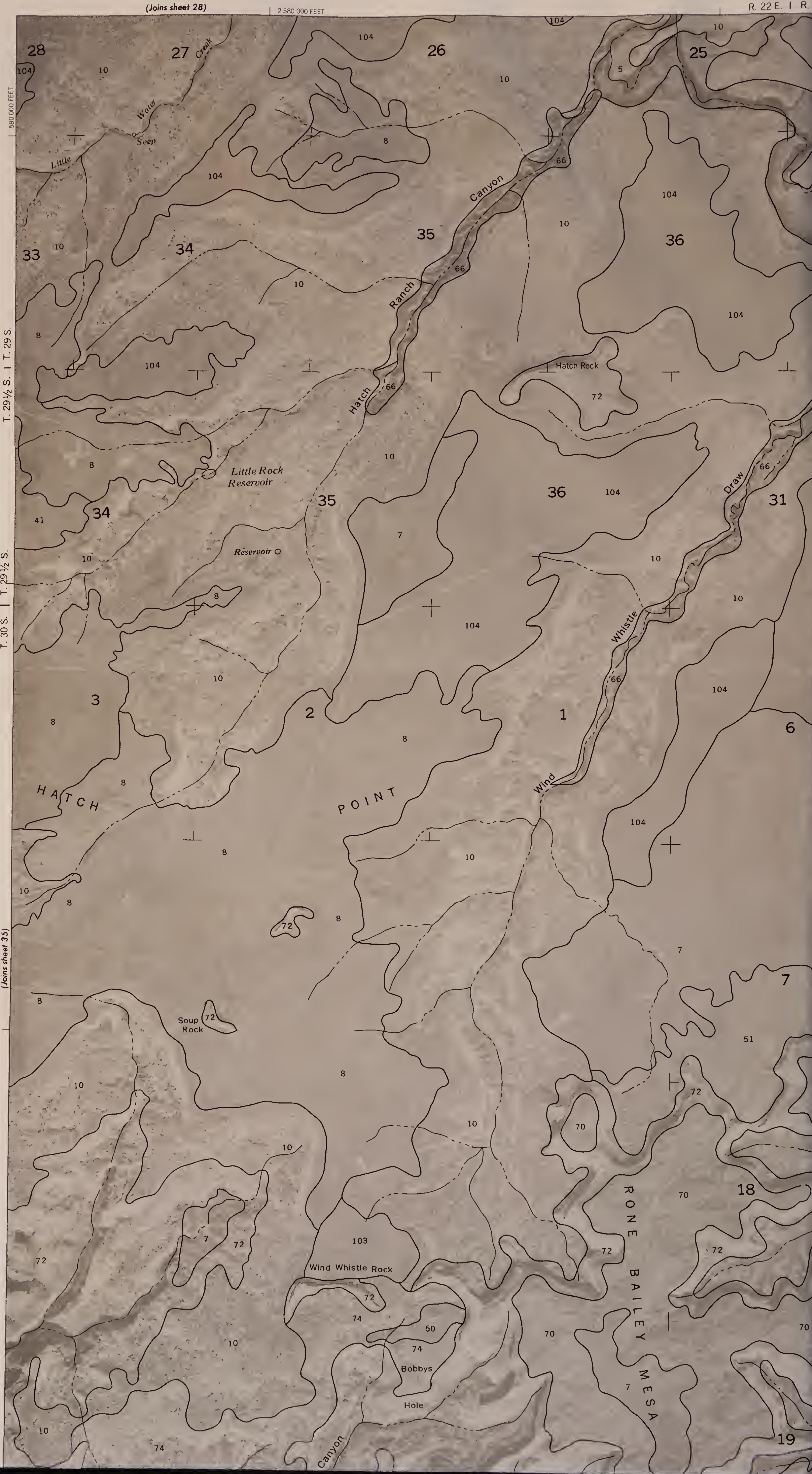
24 000

GRAND AND SAN JUAN COUNTIES NO. 35

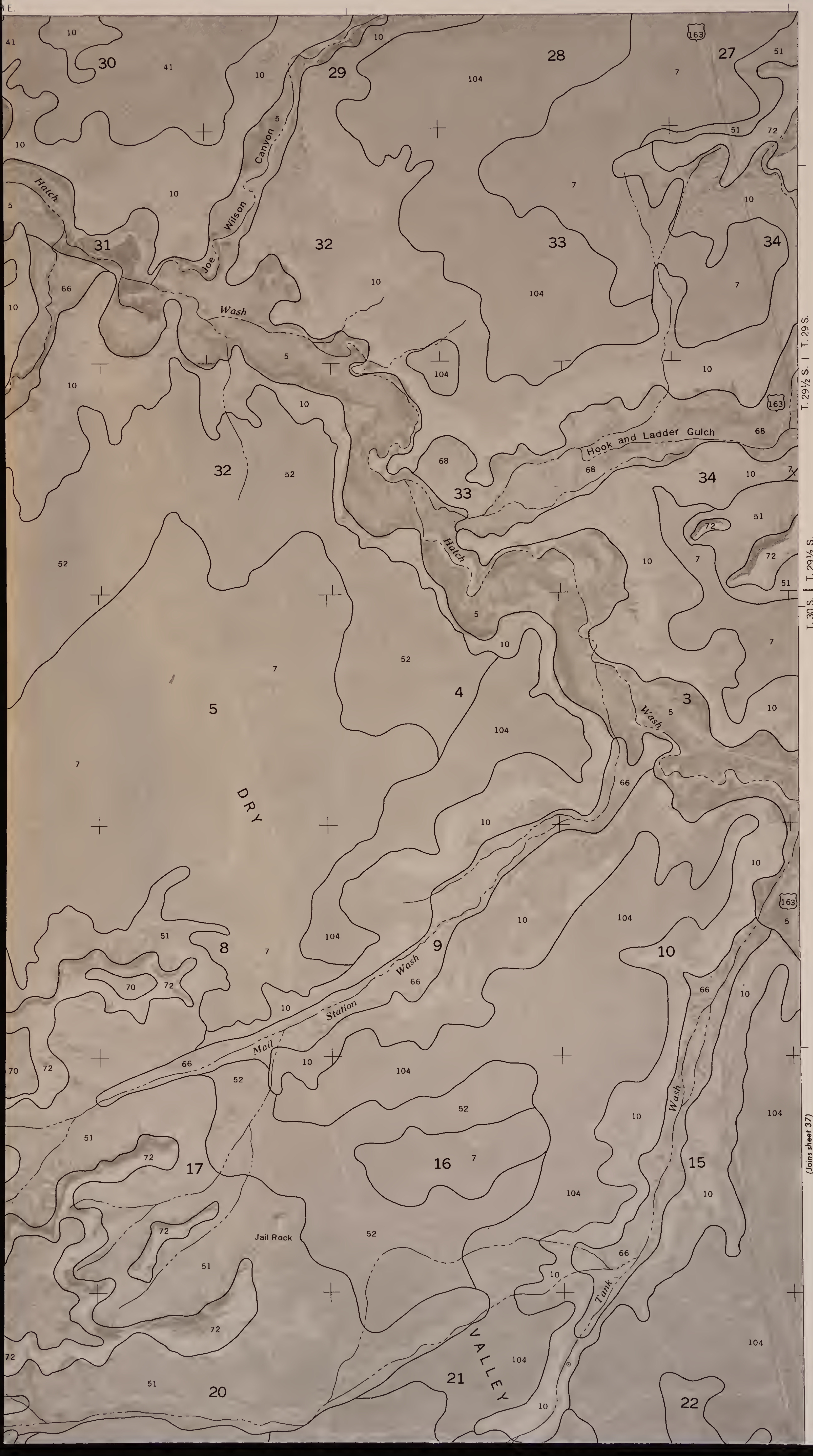
2 MILES
2 KILOMETERS
SCALE 1:24 000

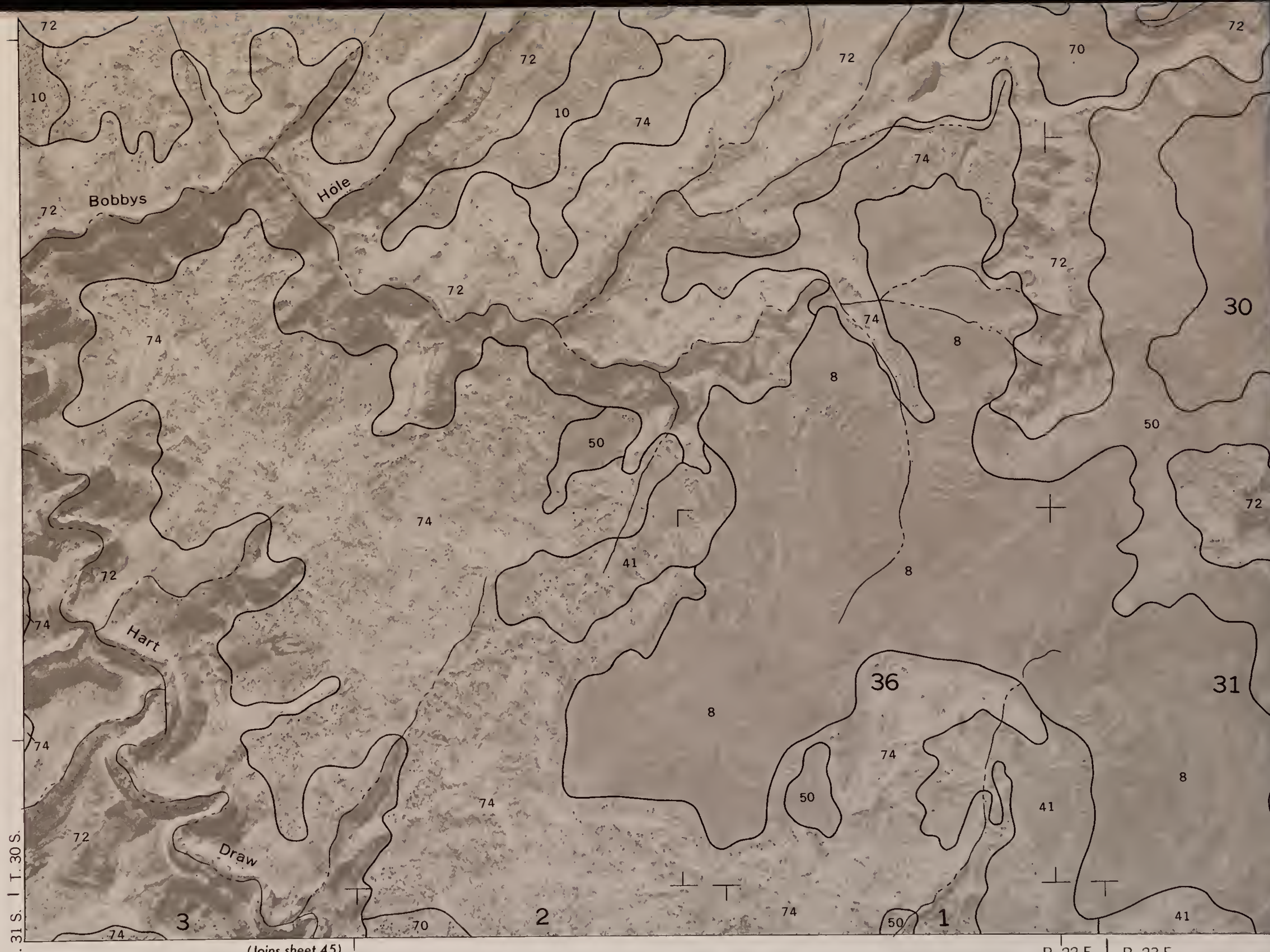
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 36
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





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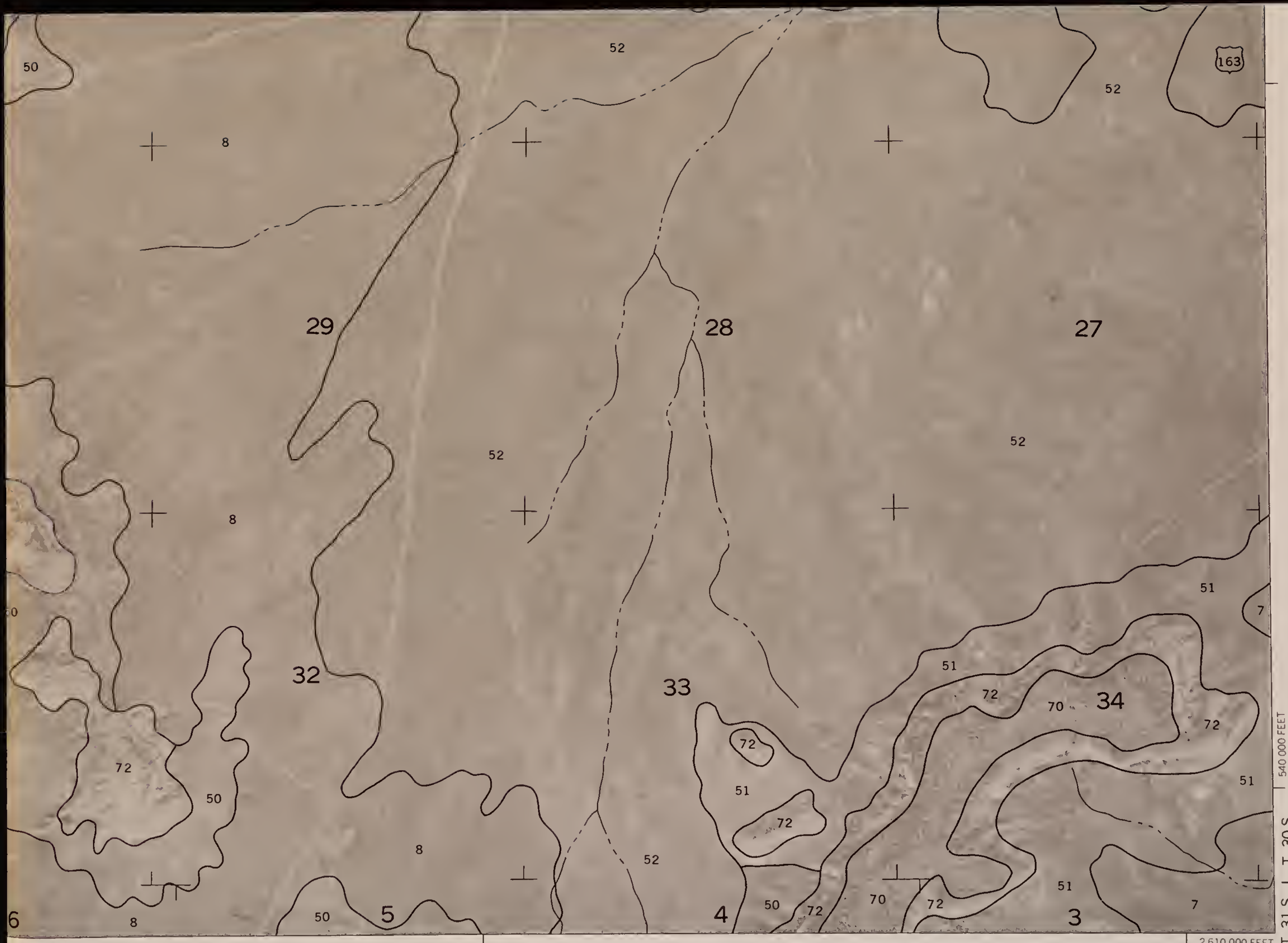
SCALE 1

CANYONLANDS AREA, UTAH, PARTS OF

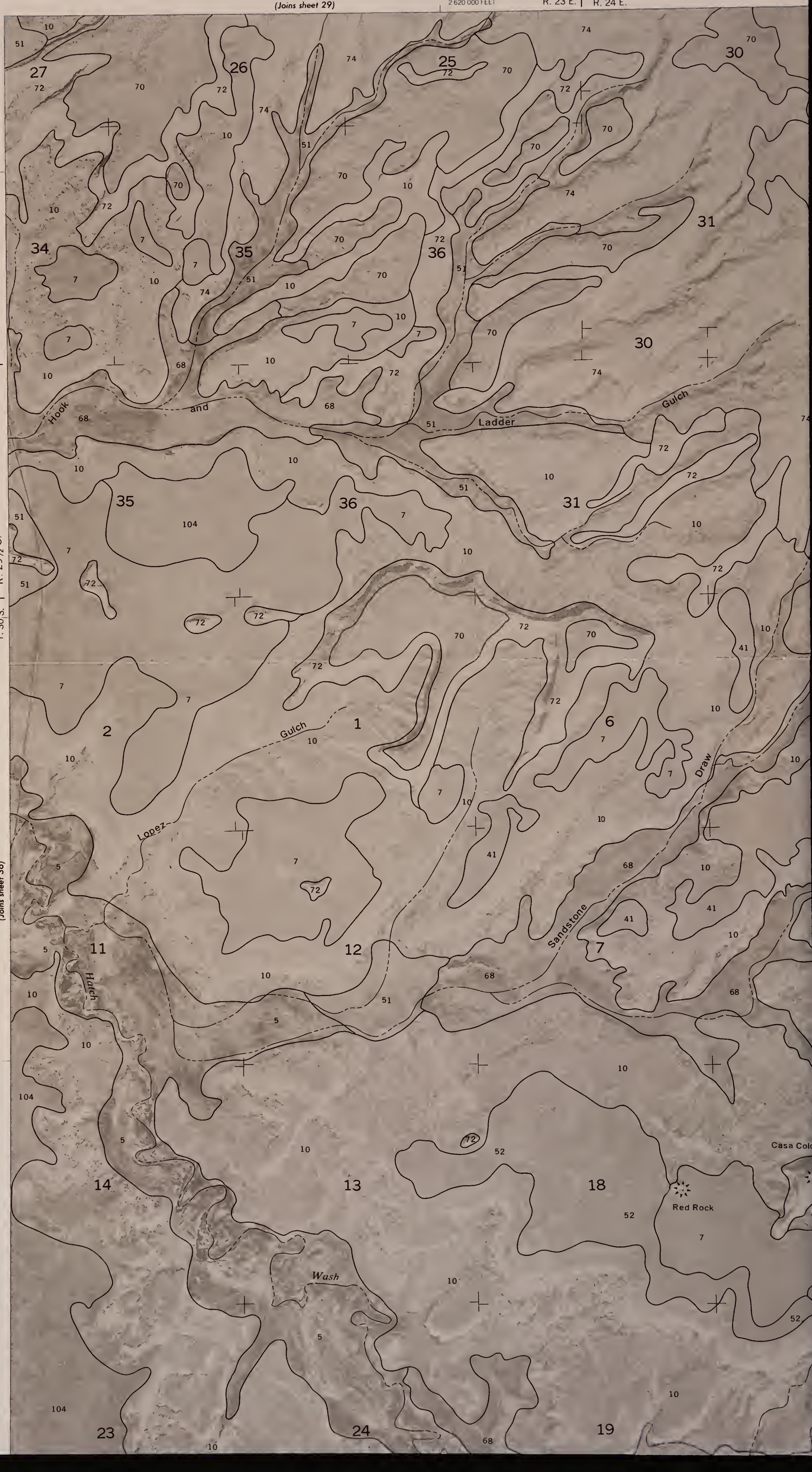


1
2 MILES
1
2 KILOMETERS
24 000

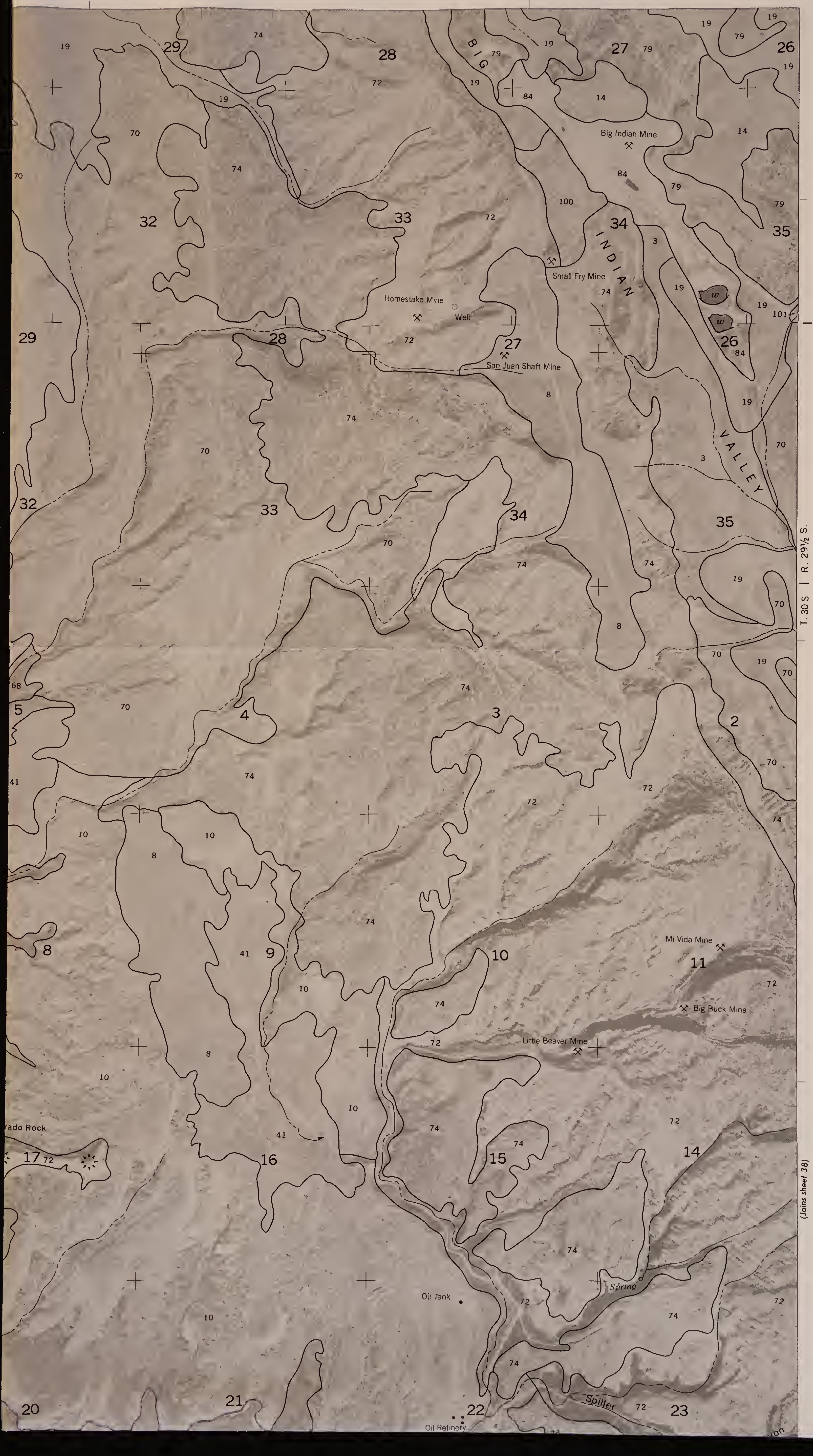
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

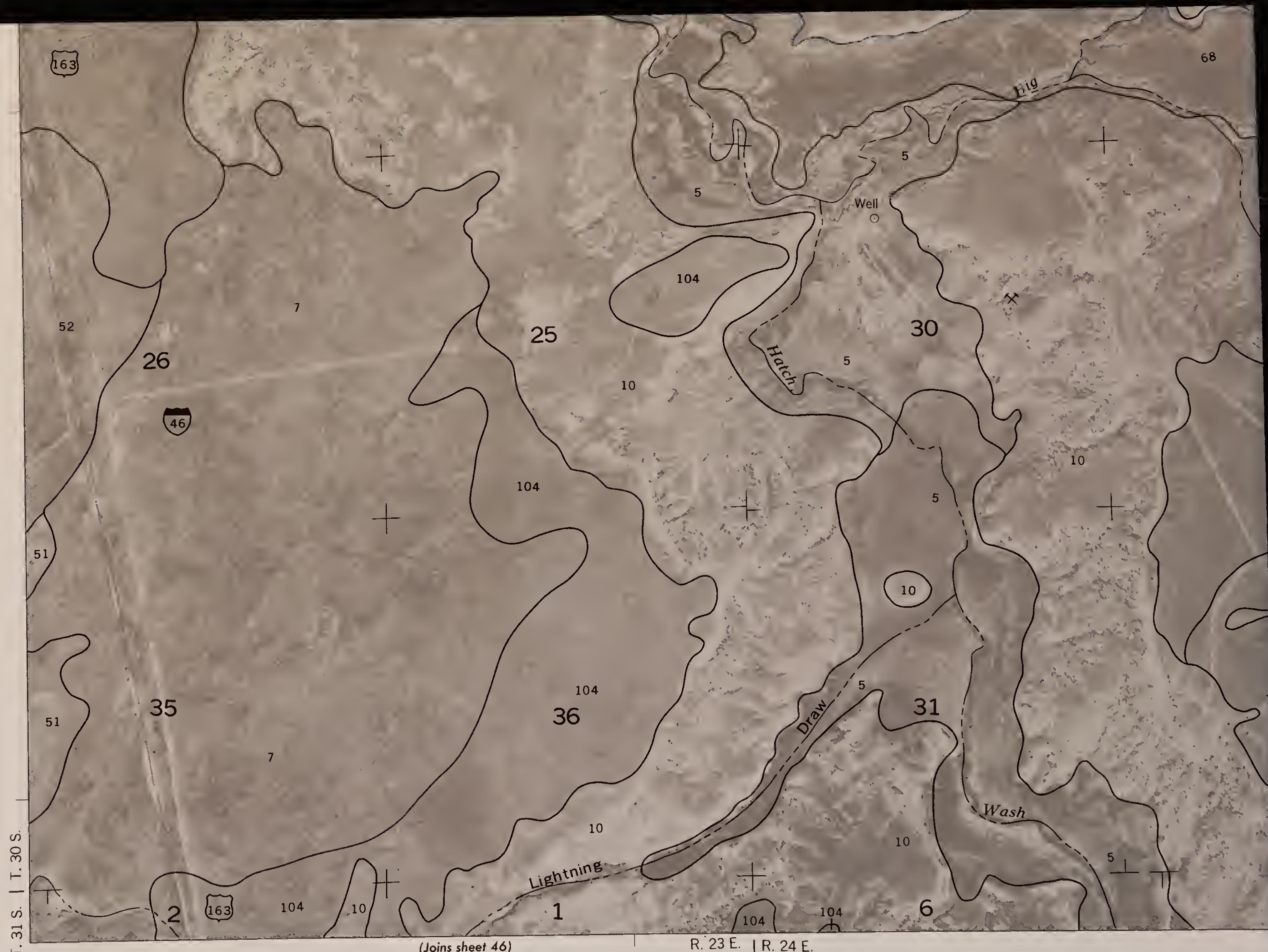
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 37
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



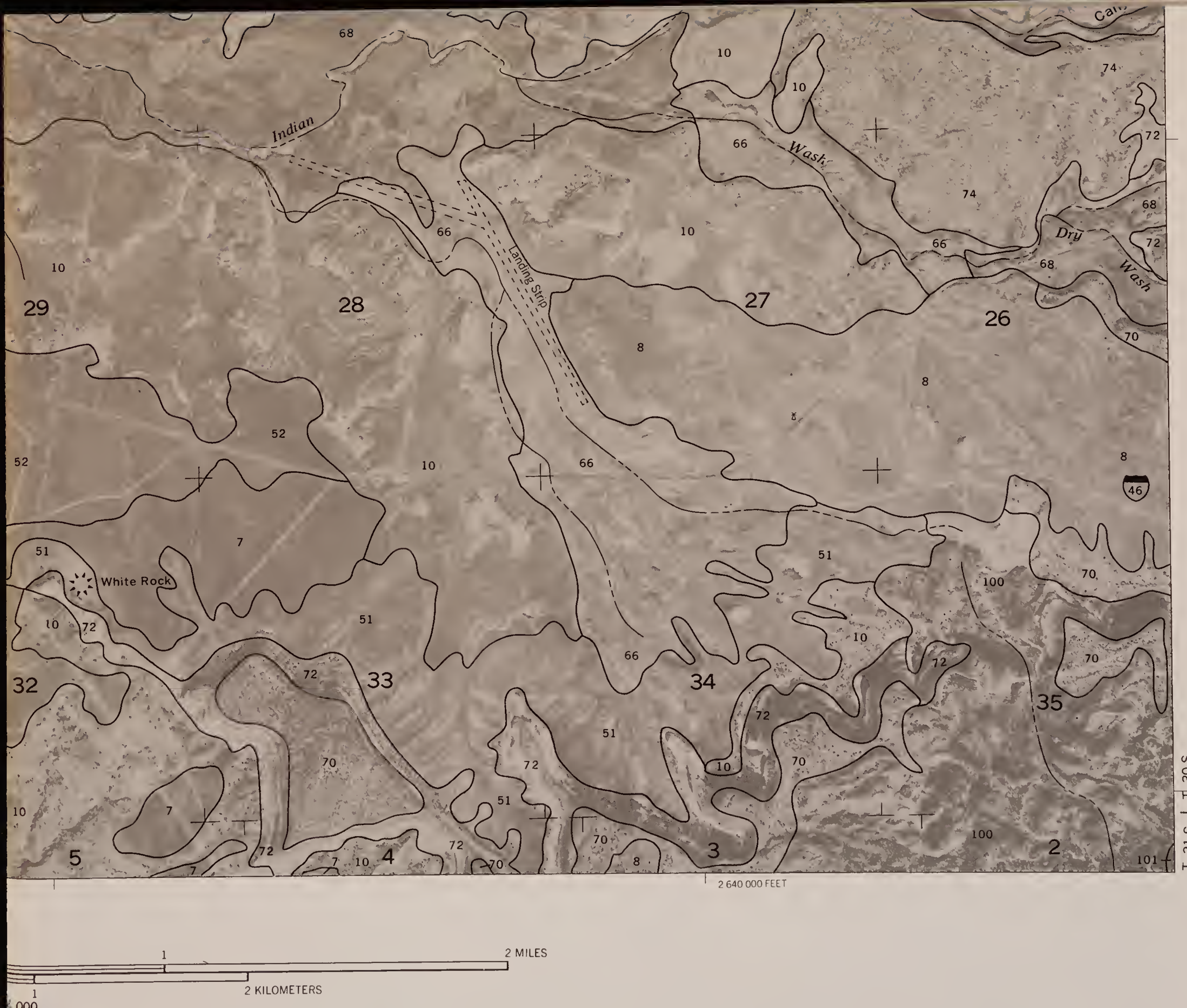


1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



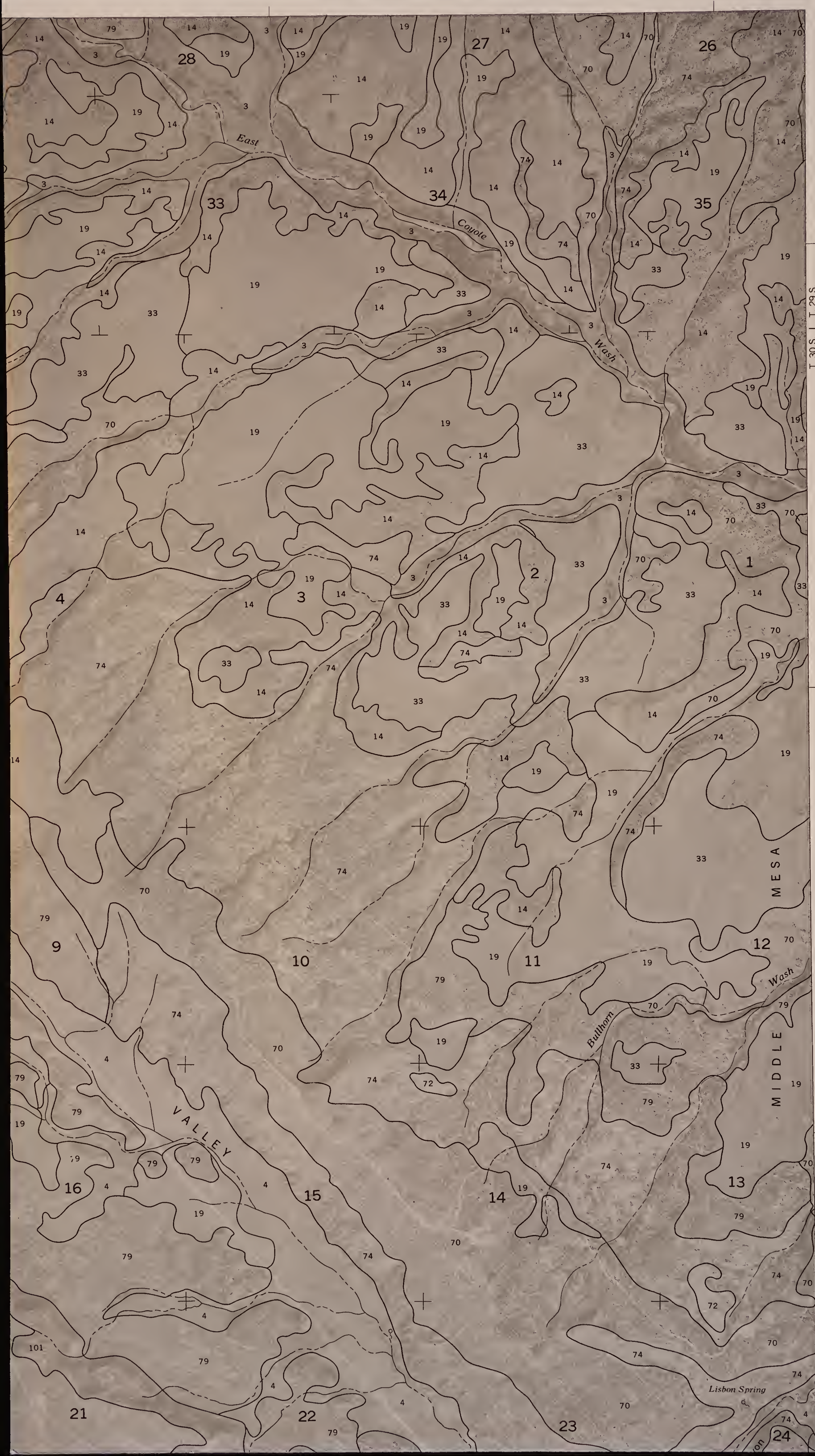
Indian
Wash
Dry
Wash
Landing Strip
White Rock
29
28
27
26
32
33
34
35
5
4
3
2
46
T. 31 S.
T. 30 S.
2 640 000 FEET
1
2 MILES
1
2 KILOMETERS
000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 38
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

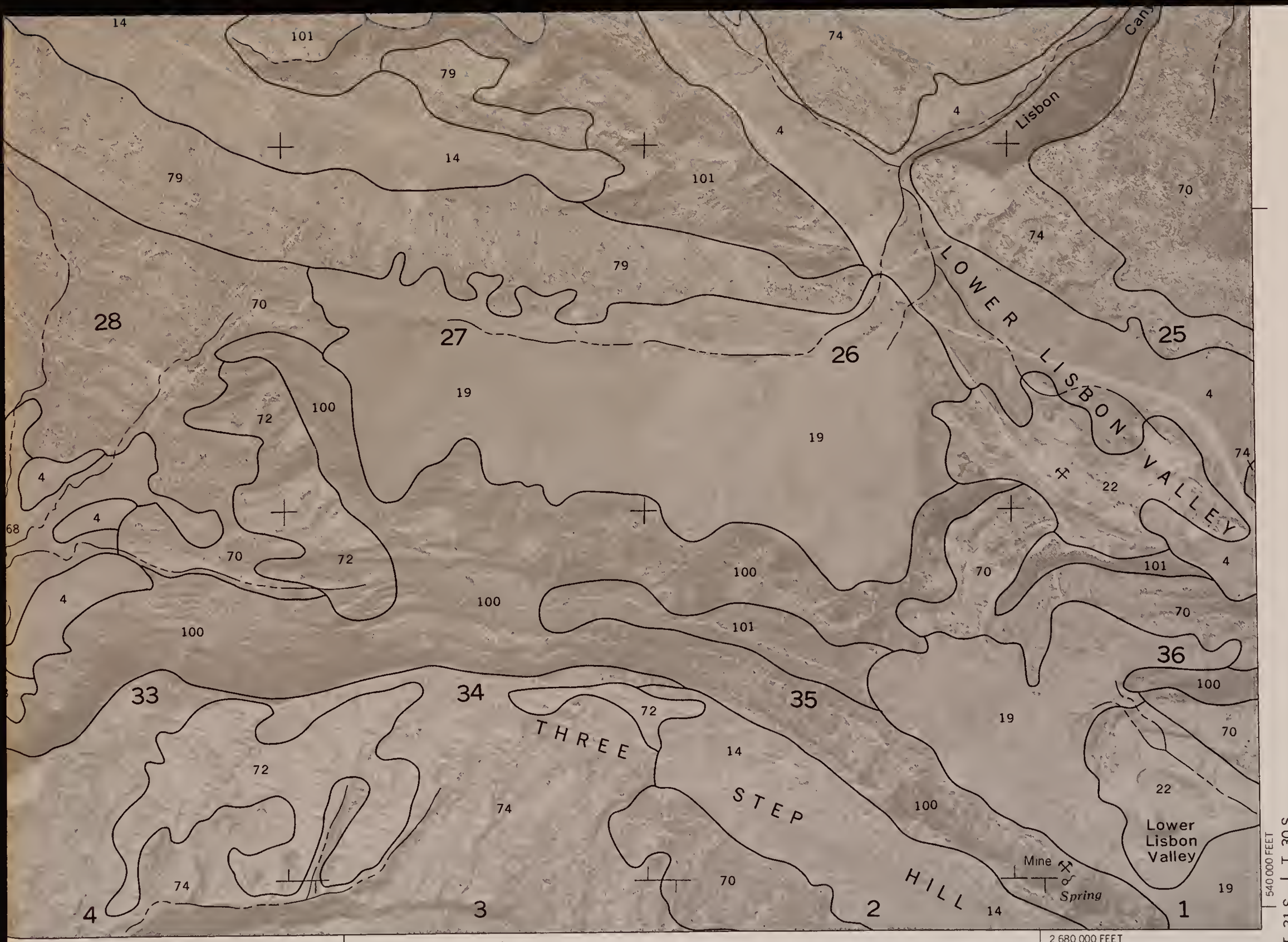


This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

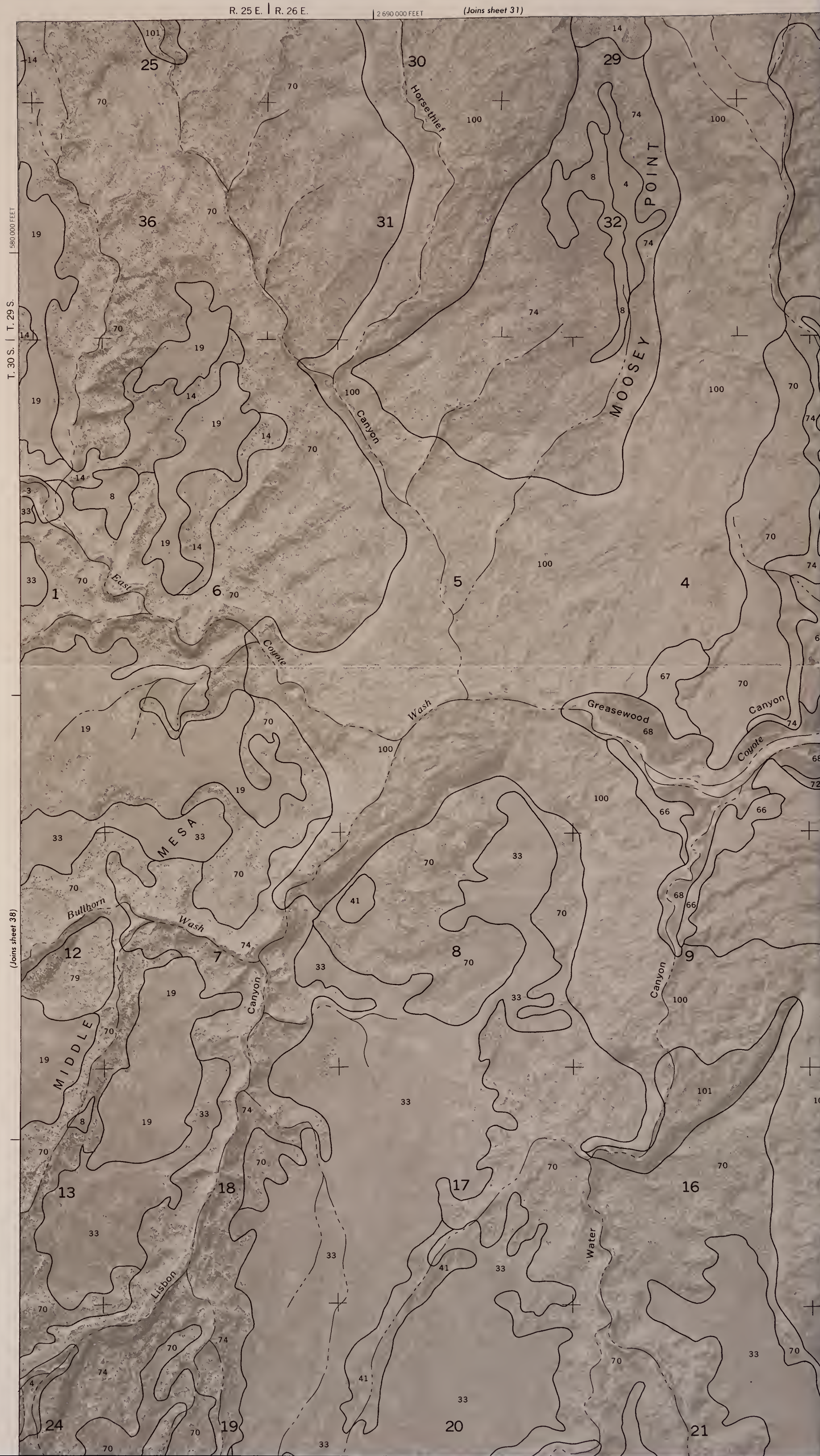

Lisbon
Can
LOWER LISBON VALLEY
THREE STEP HILL
Lower Lisbon Valley
Mine
Spring
28
27
26
25
33
34
35
36
4
3
2
1
2 680 000 FEET
540 000 FEET
T. 31 S.
T. 30 S.

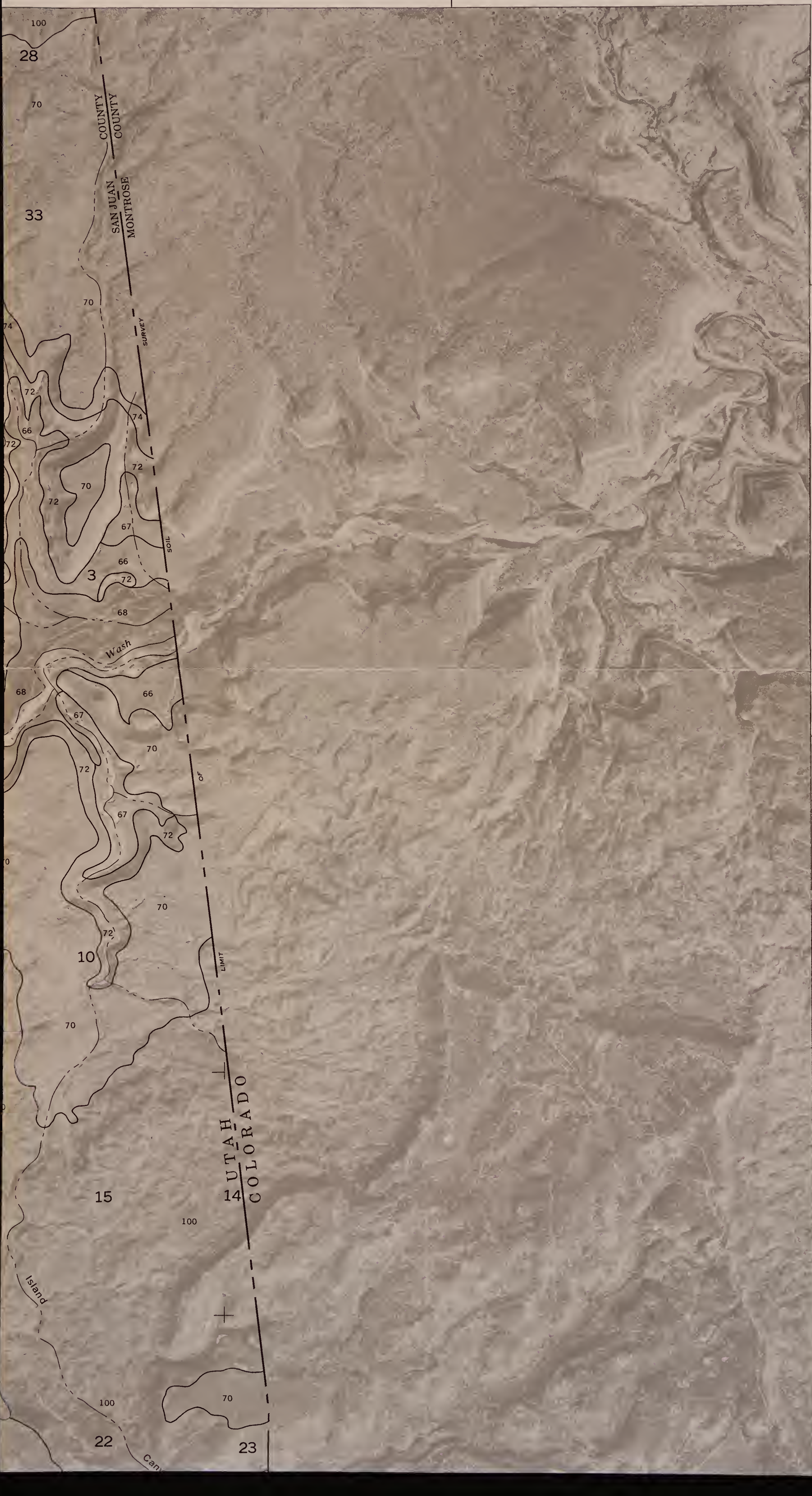

1
2 MILES
1
2 KILOMETERS
24 000

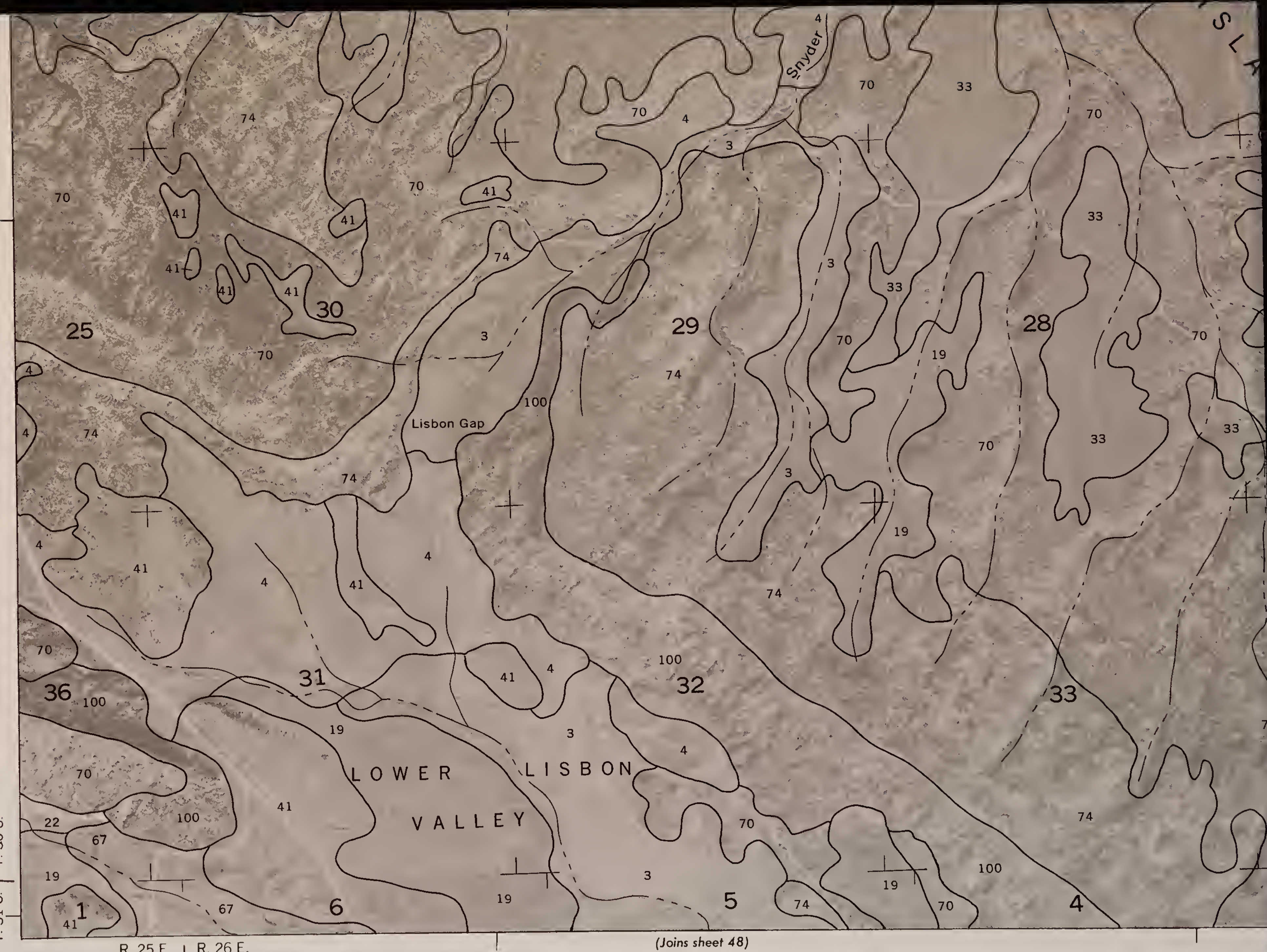
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE




100
28
SAN JUAN COUNTY
MONTROSE COUNTY
33
70
74
72
66
72
70
72
67
3
66
72
68
Wash
68
66
67
70
72
67
72
70
72
10
70
LIMIT OF SOIL SURVEY
UTAH
COLORADO
15
14
100
Island
100
70
22
23

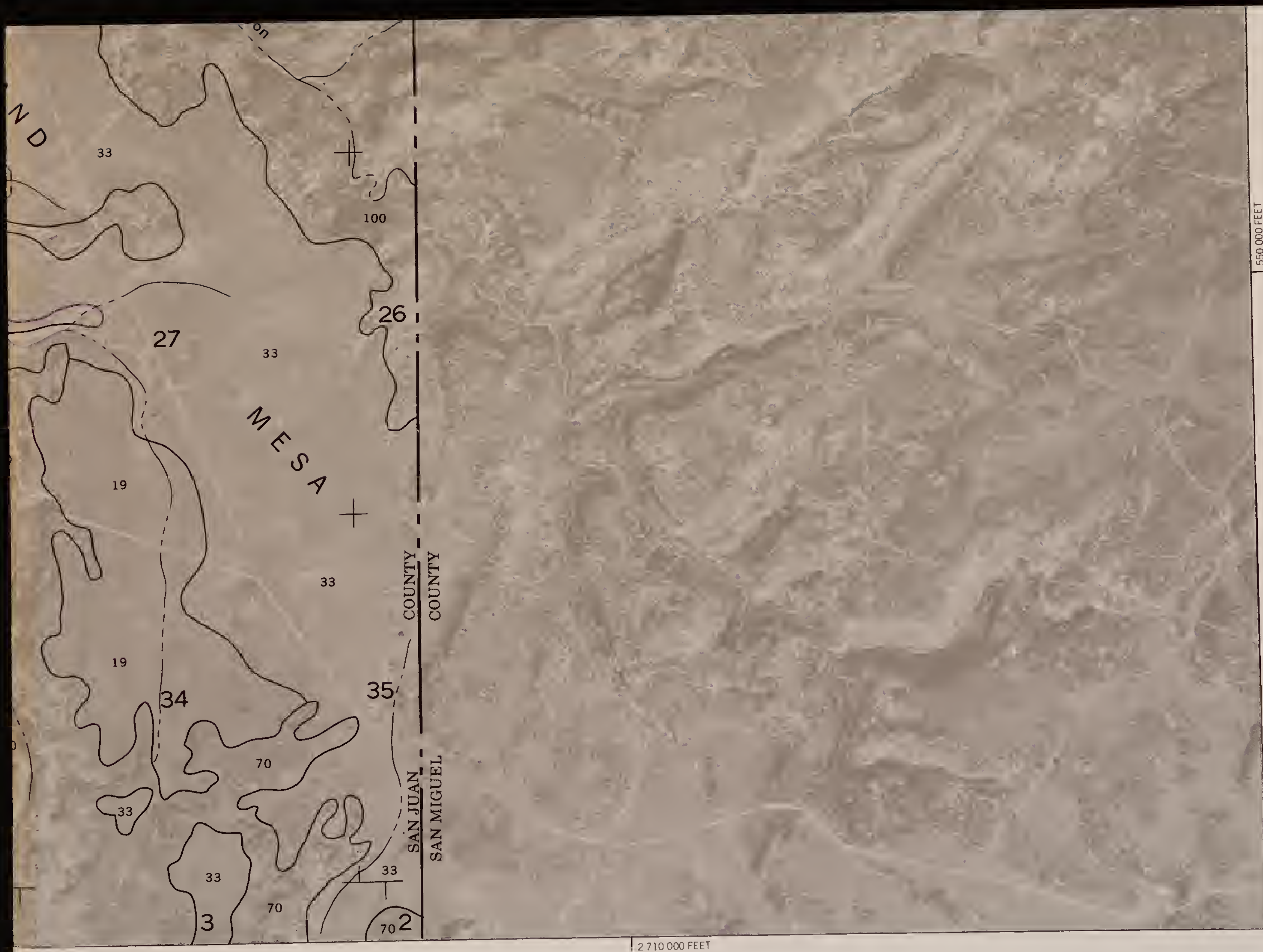


1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

1 2 KILOMETERS

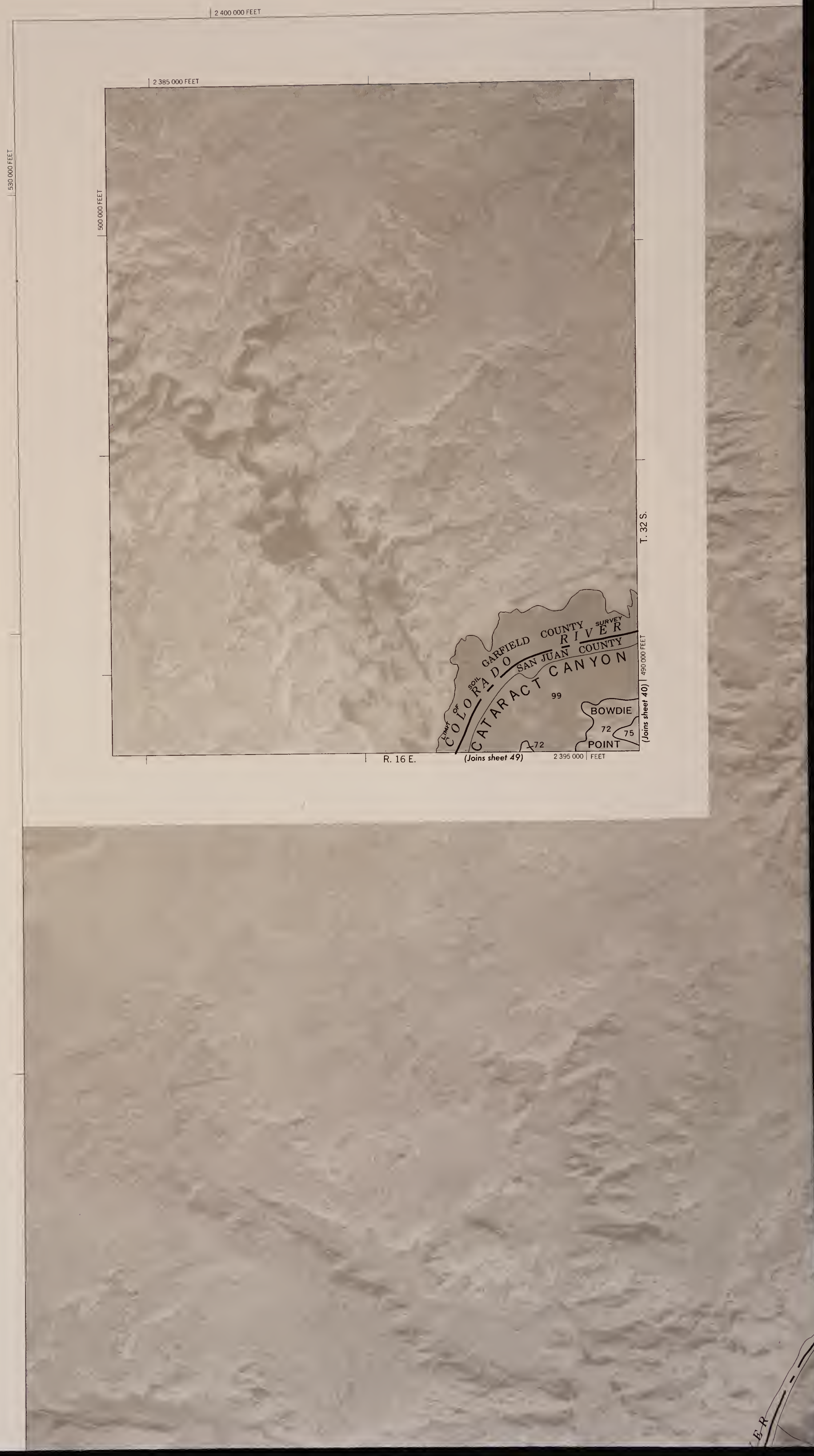
4 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

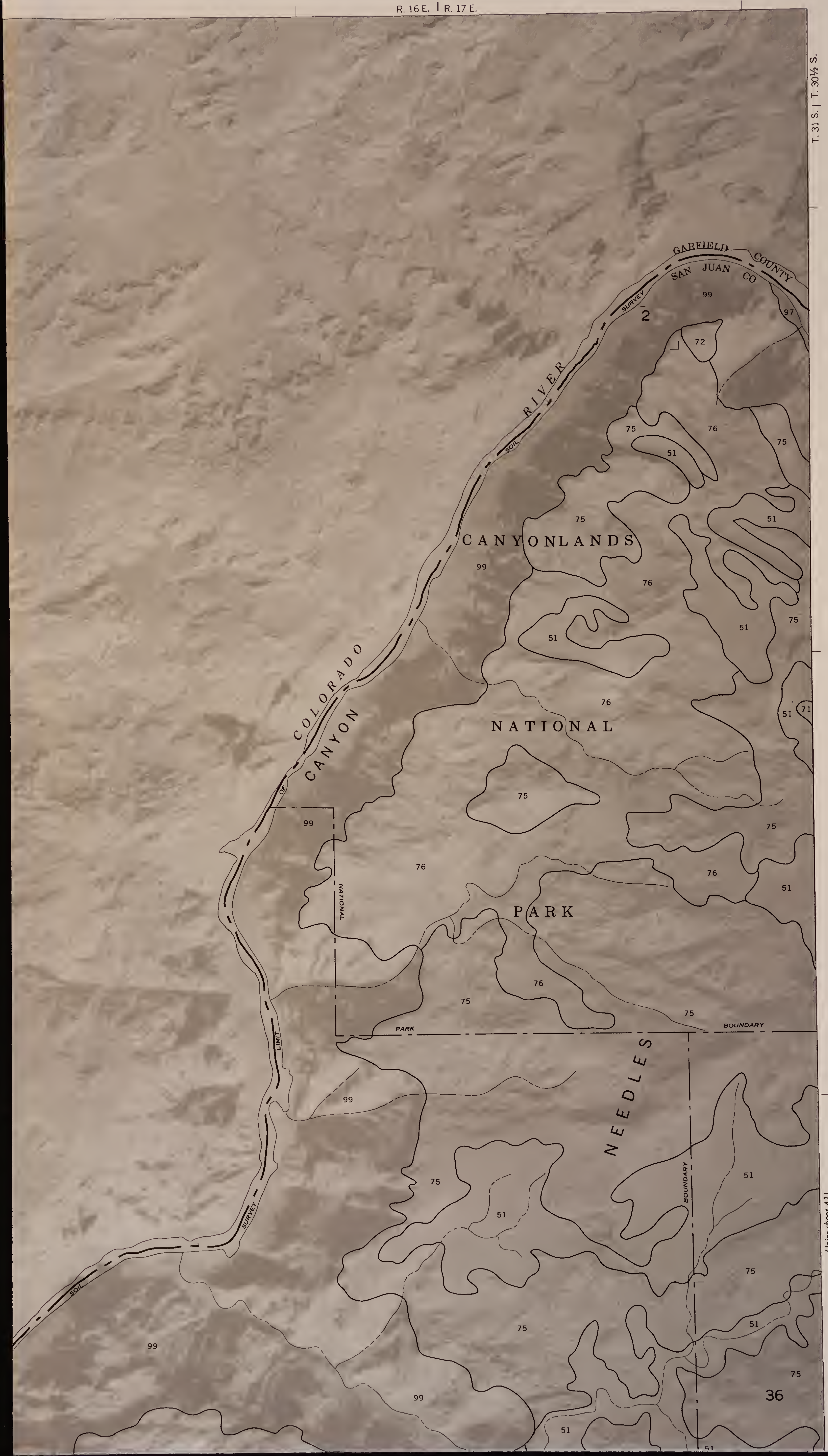
SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 40
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

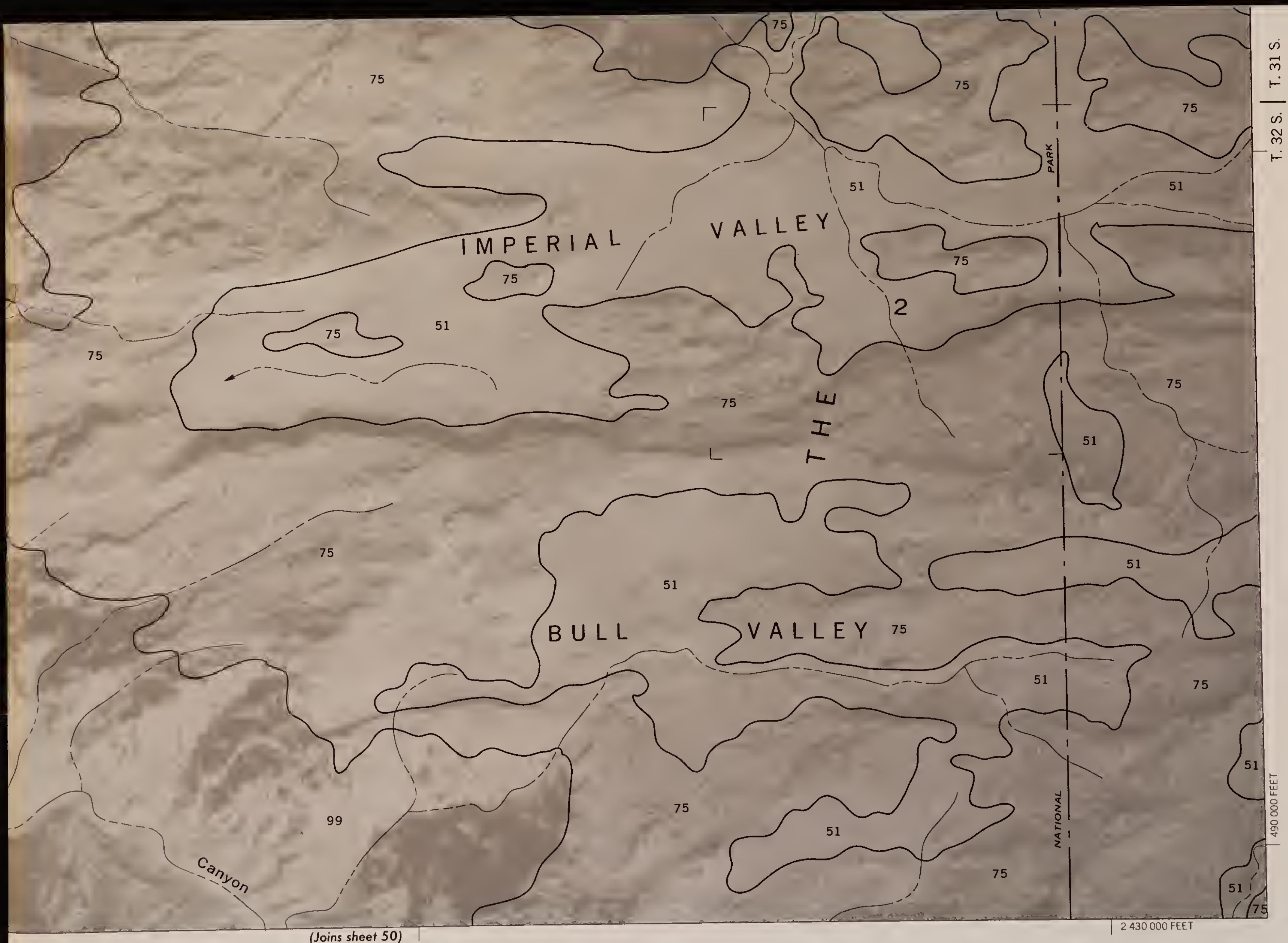


1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

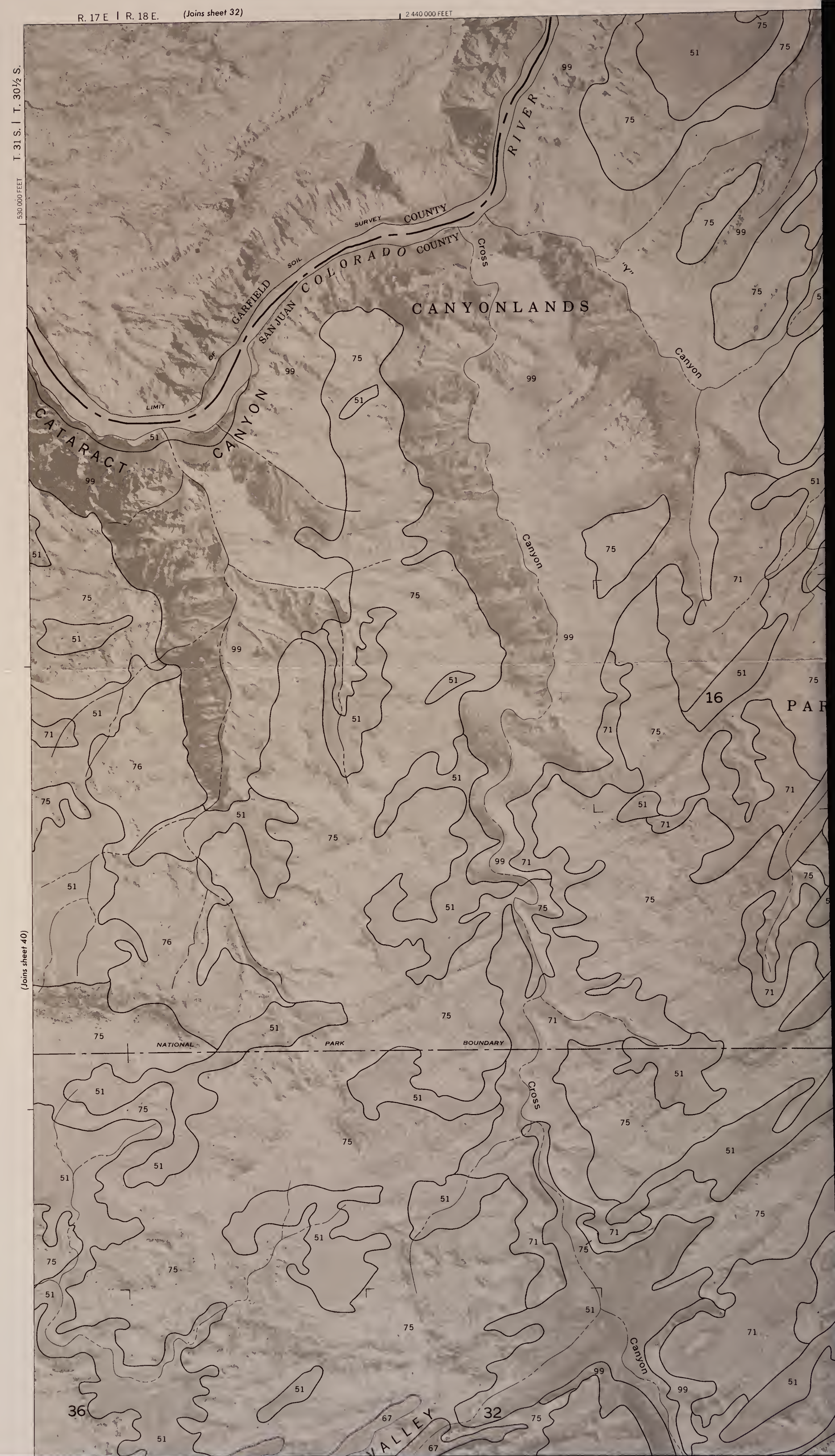


1
2 MILES
1
2 KILOMETERS
24 000

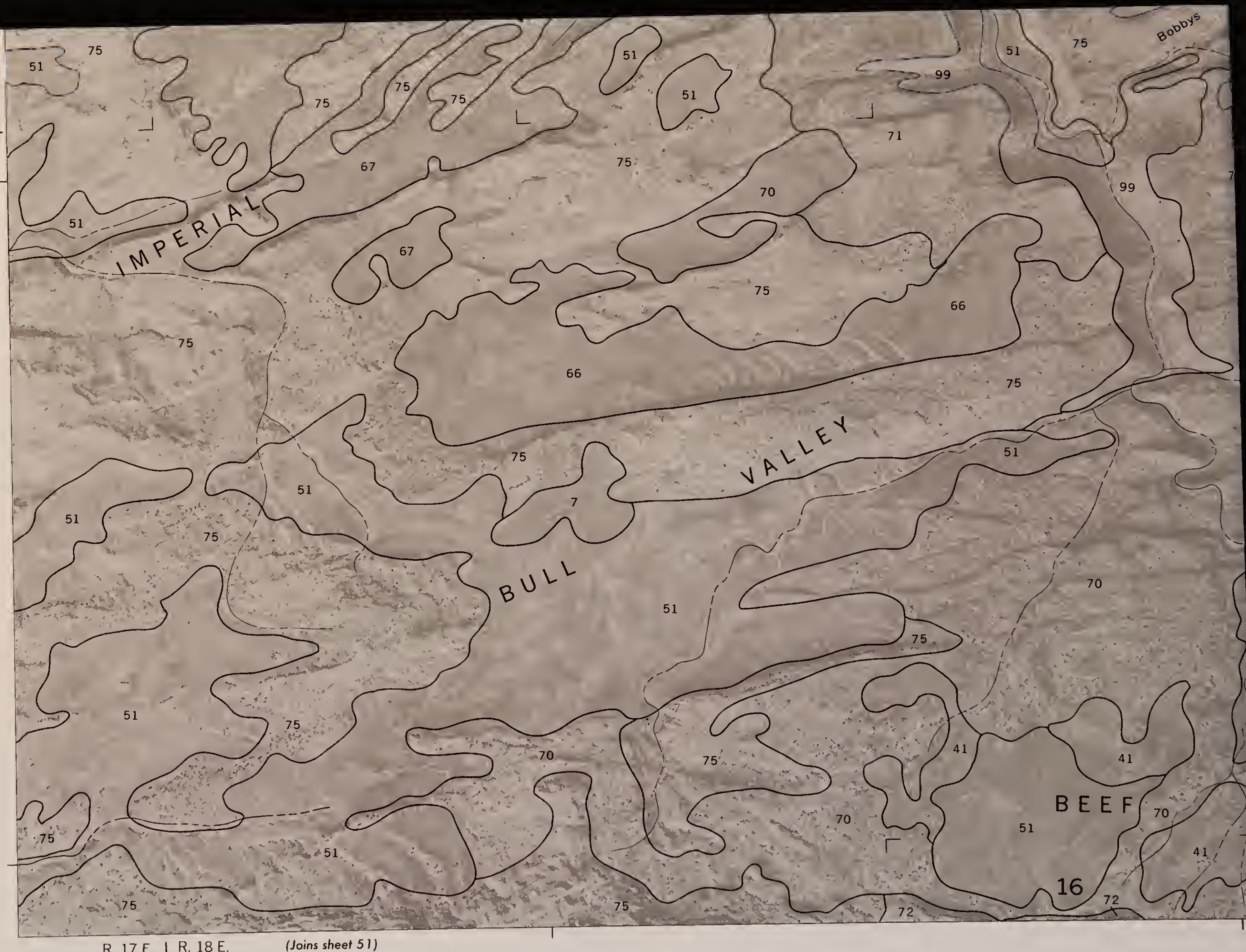
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

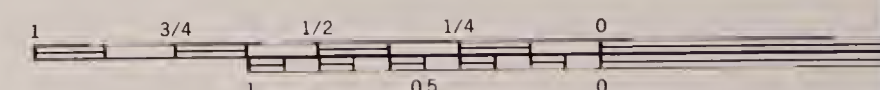
SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 41
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





SCALE 1:

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 2 MILES

1 2 KILOMETERS

4 000

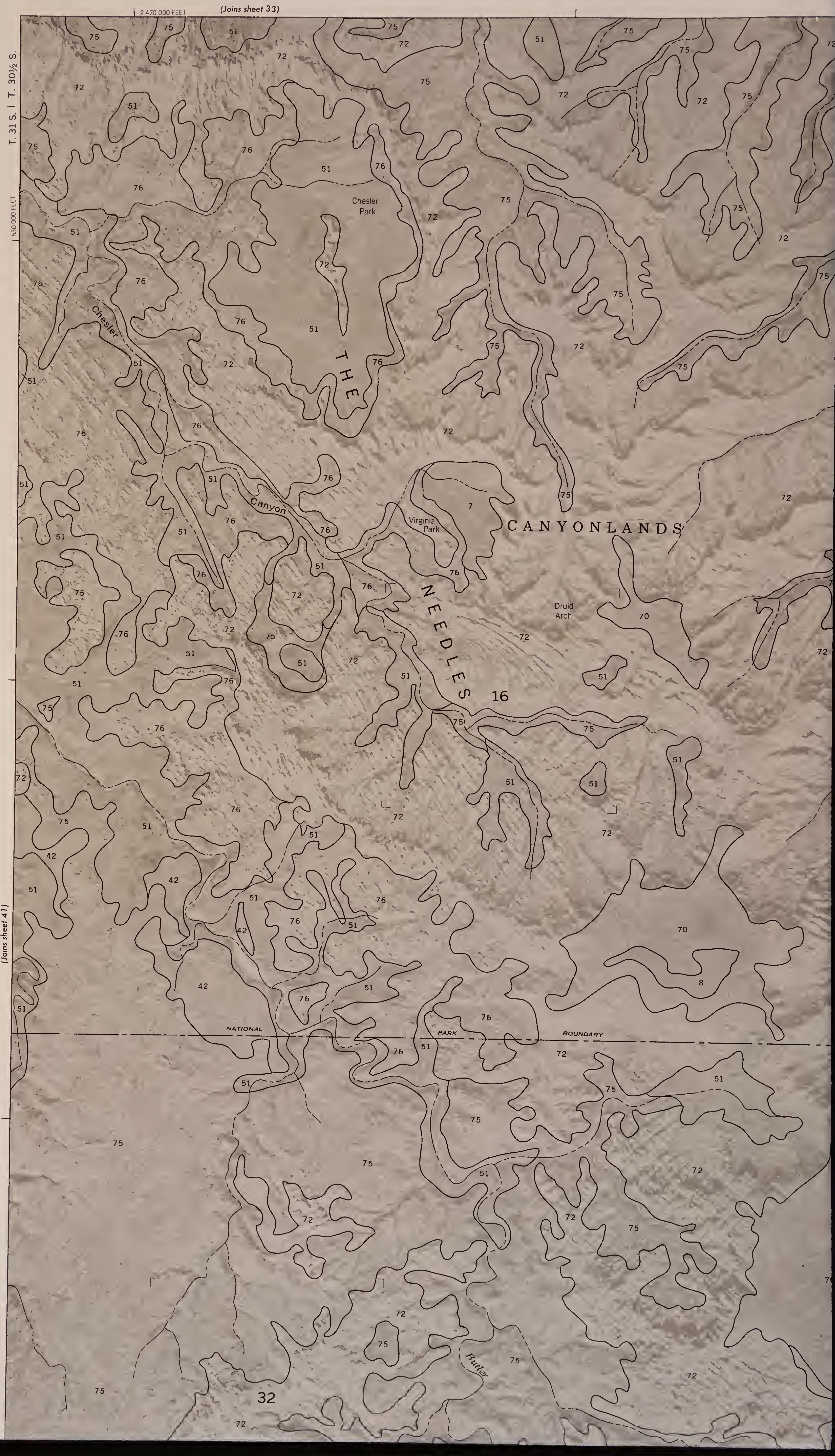
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

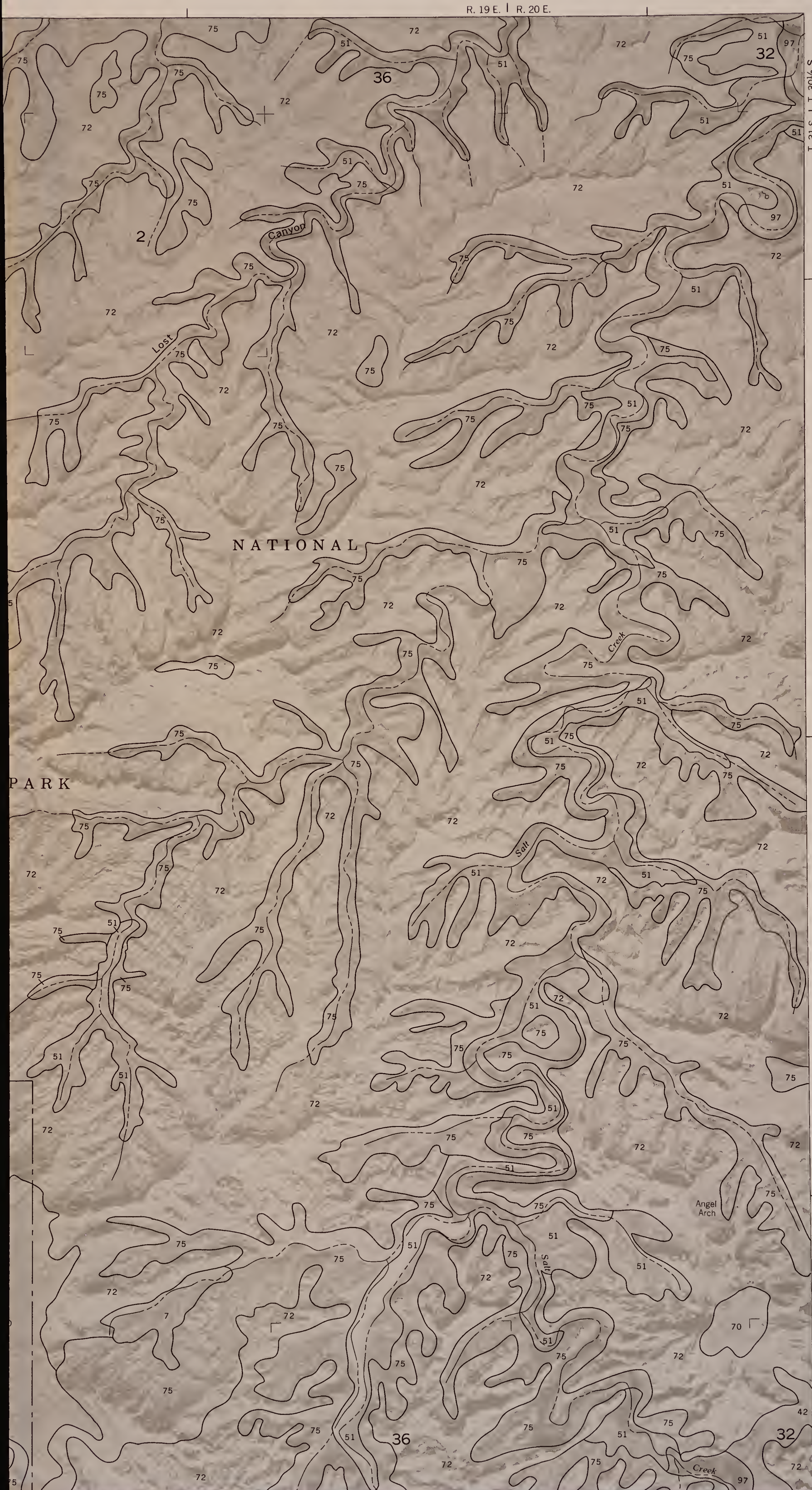
SHEET NO. 42
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

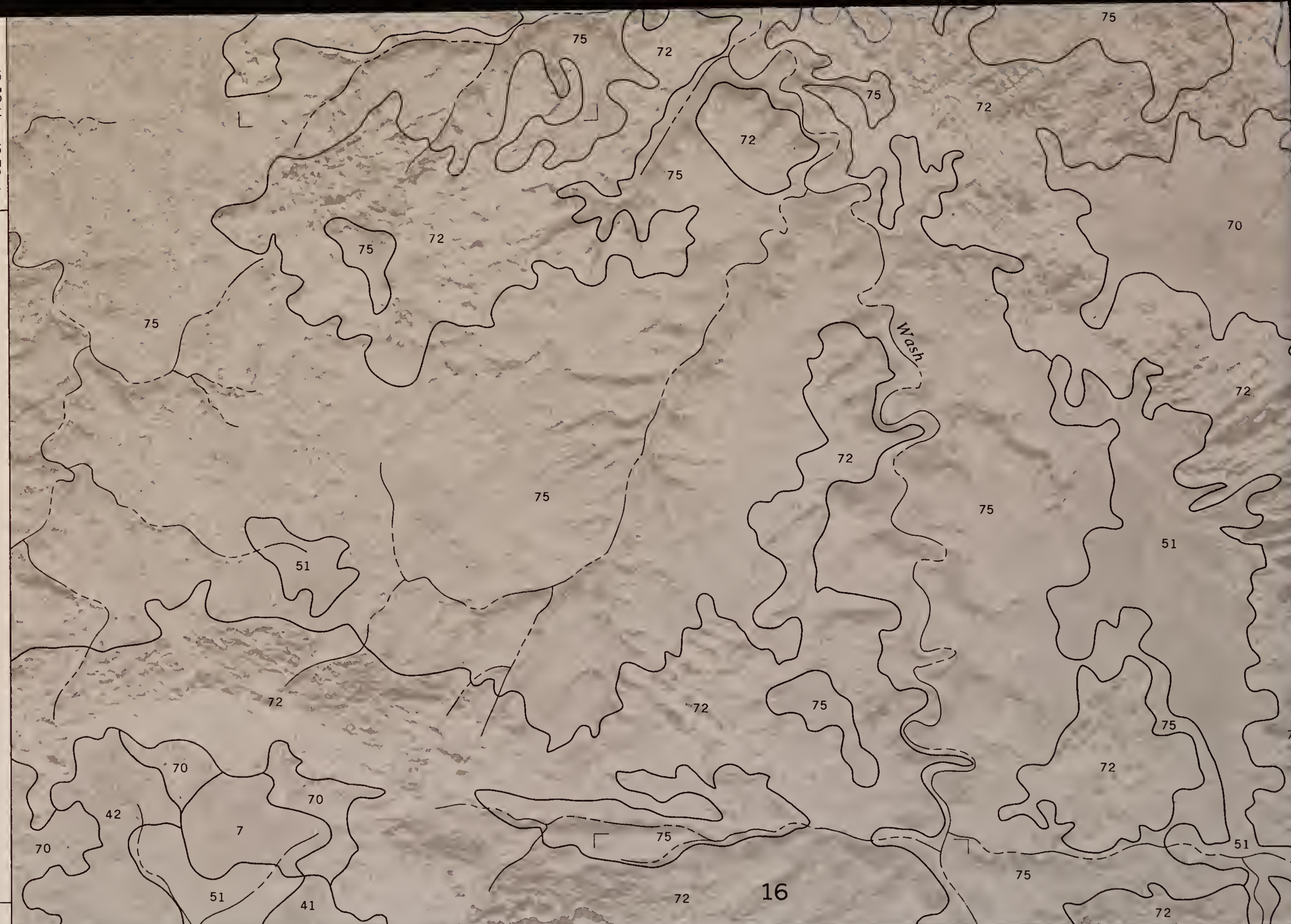
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE




R. 19 E. | R. 20 E.
T. 31 S. | T. 30½ S.
NATIONAL
PARK
Lost
Canyon
Salt
Creek
Angel Arch
(Joins sheet 43)



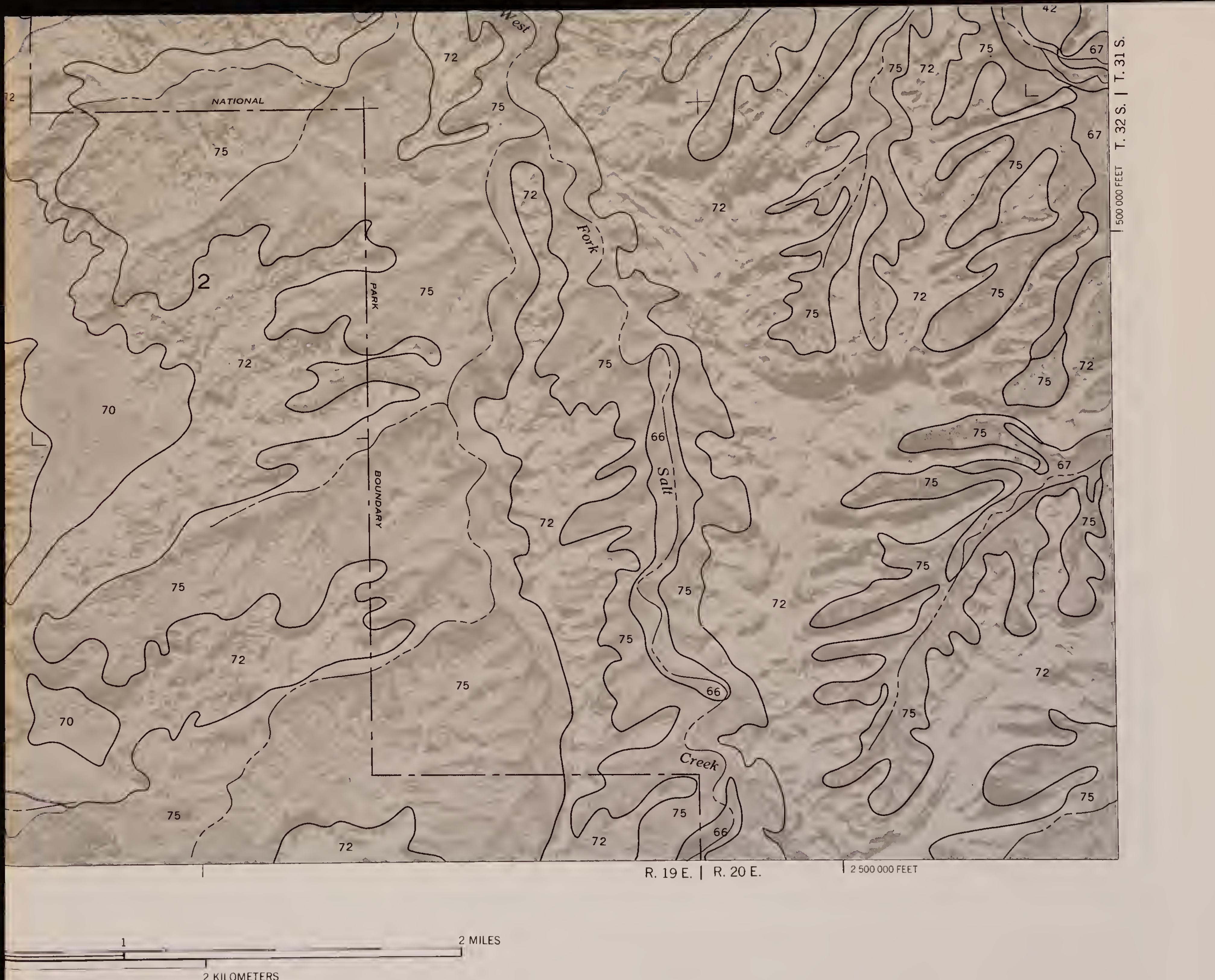
(Joins sheet 52)

1 3/4 1/2 1/4 0

1 0.5 0 1

SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

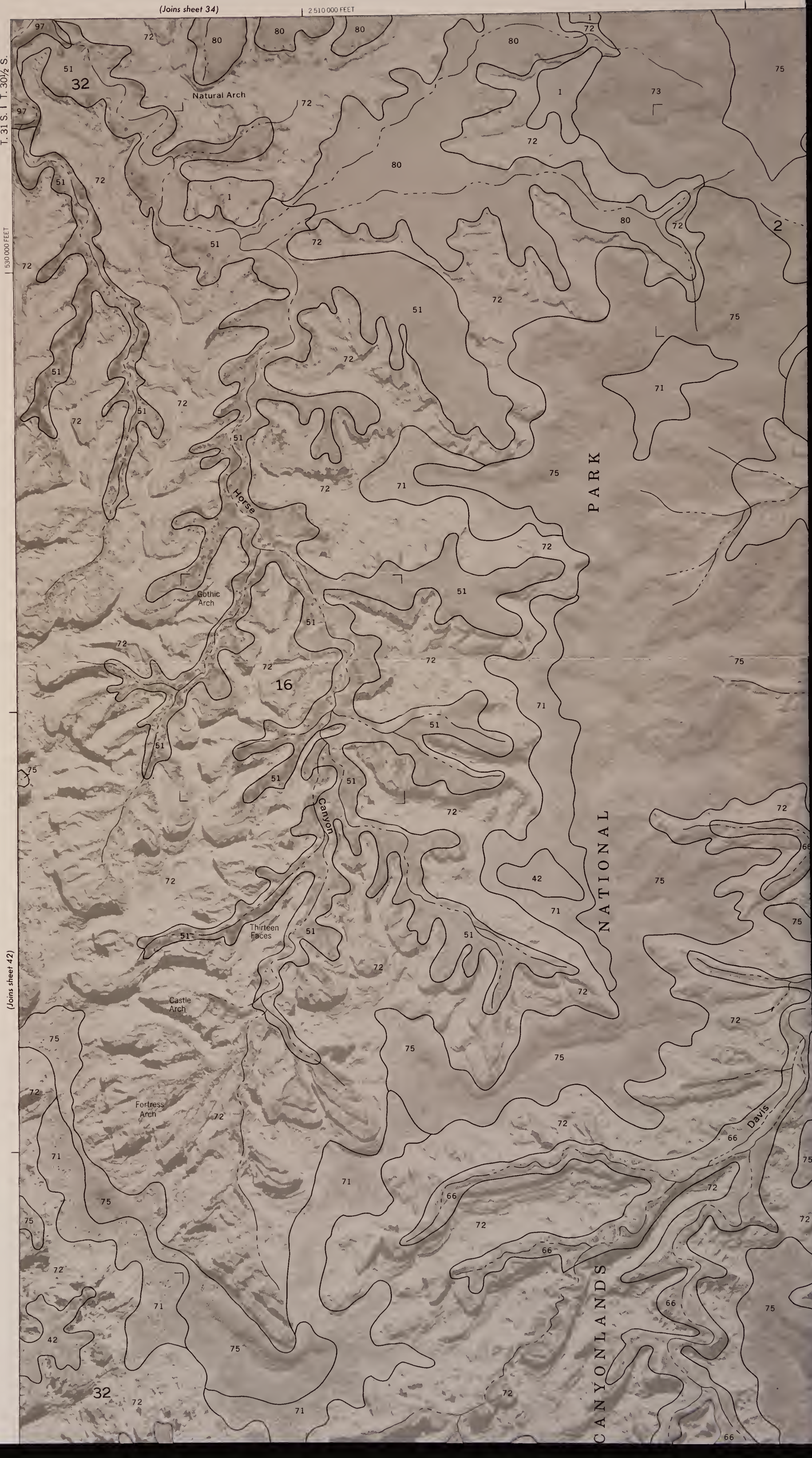


D AND SAN JUAN COUNTIES NO. 42

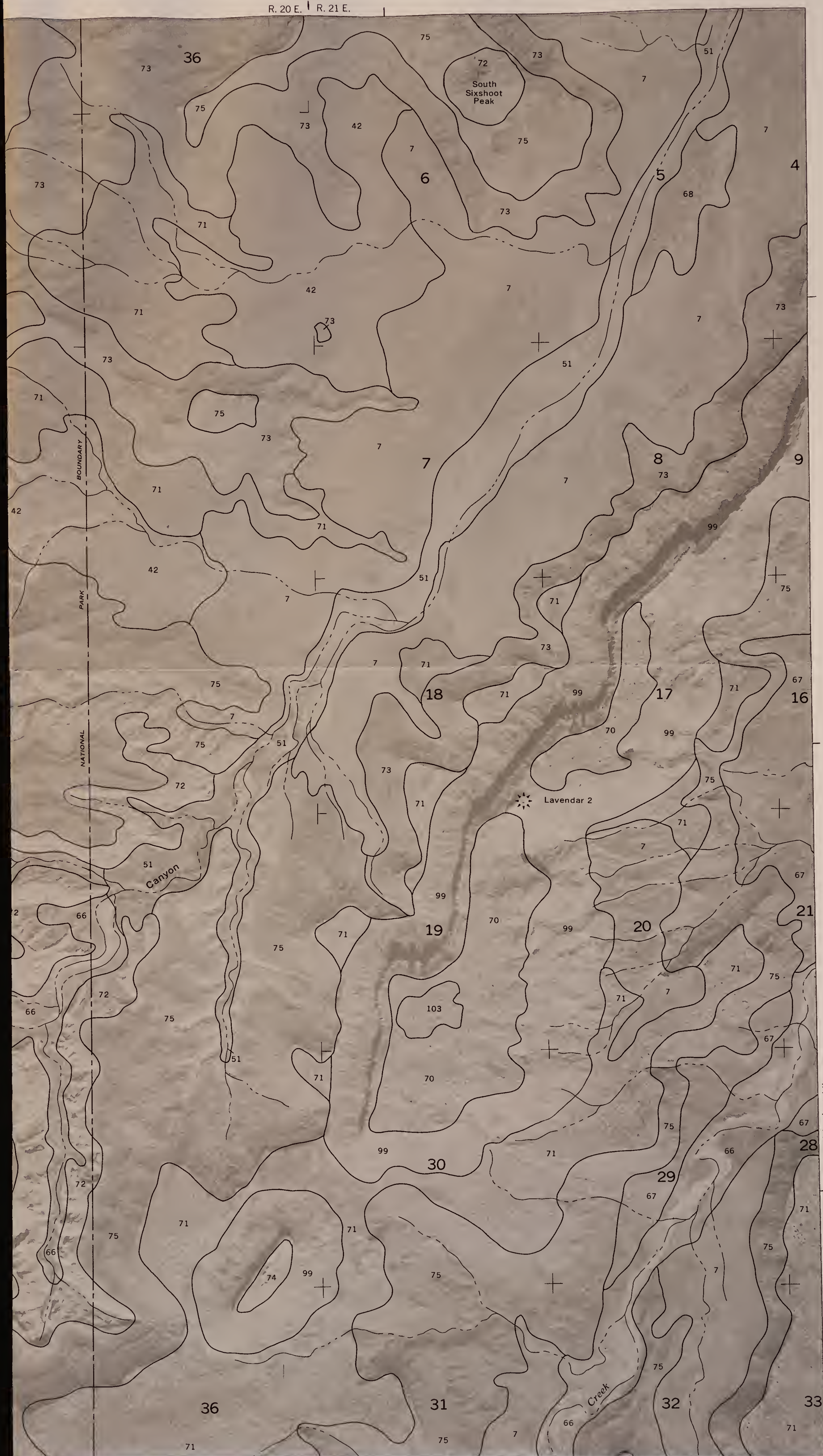
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

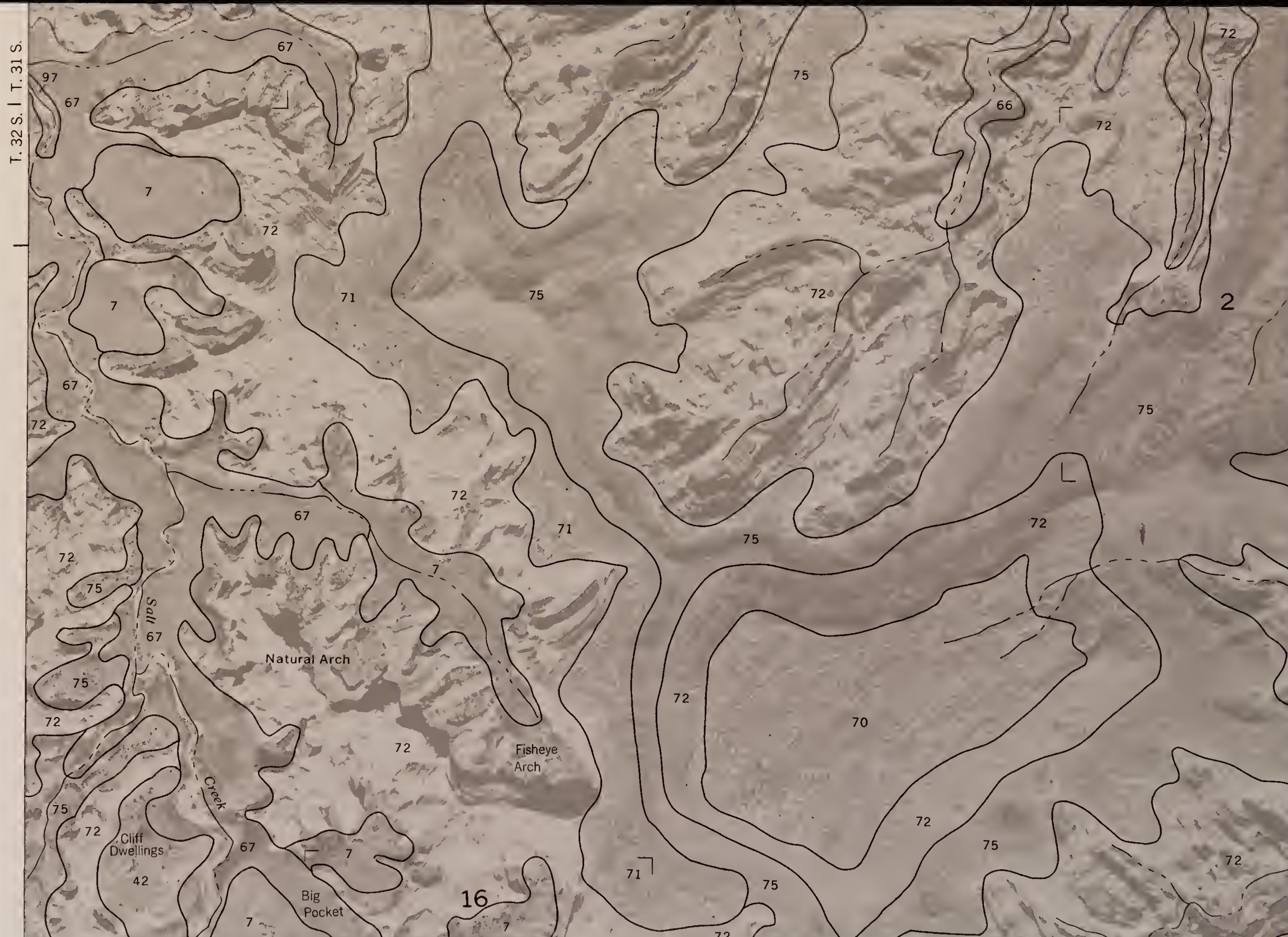
SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

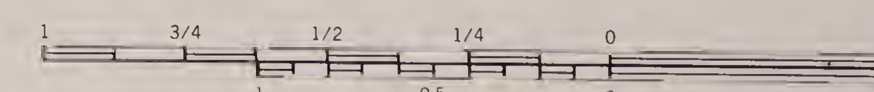


SHEET NO. 43
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



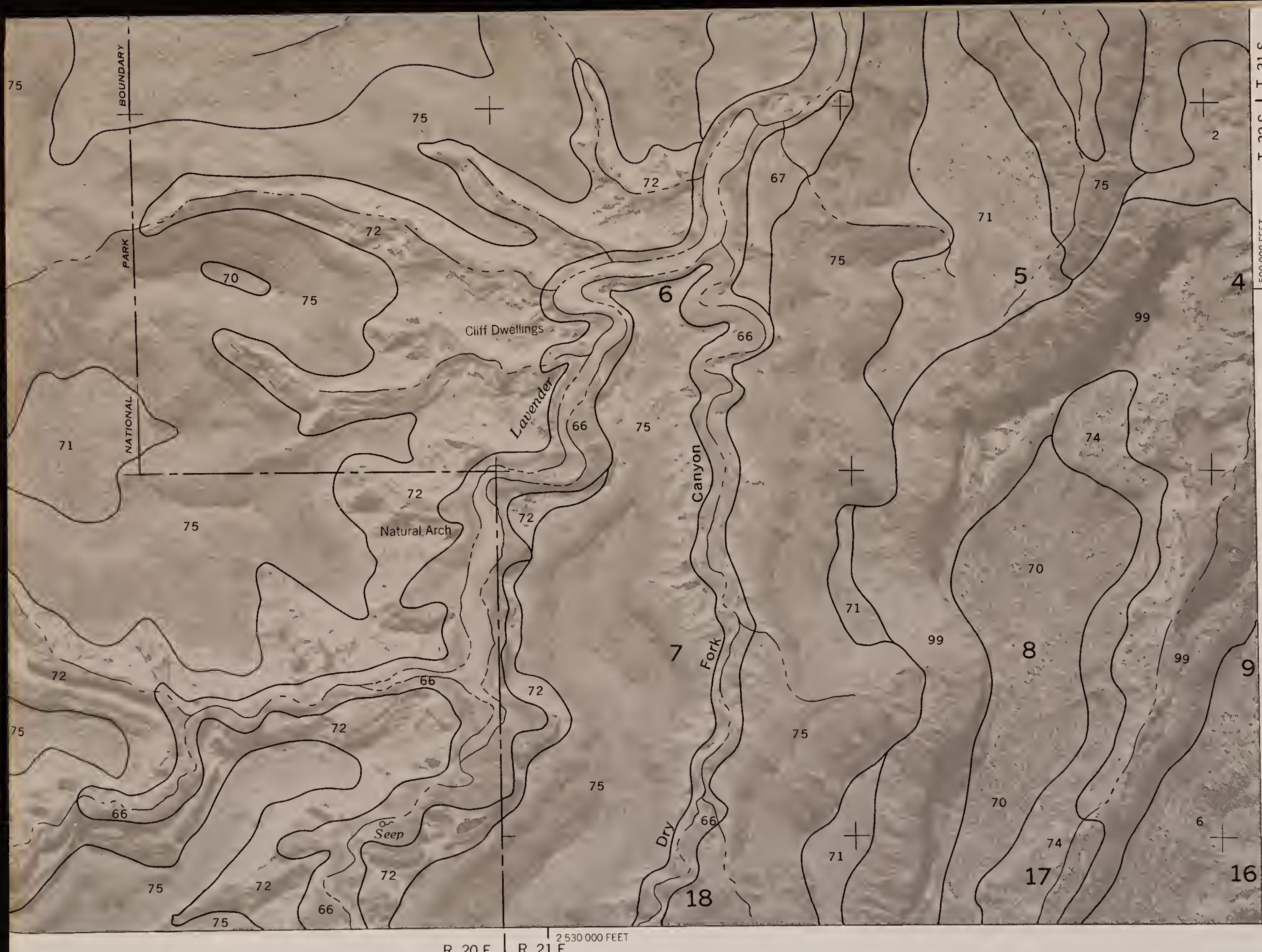


(Joins sheet 53)



SCALE 1:

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1
2 MILES
1
2 KILOMETERS
24 000

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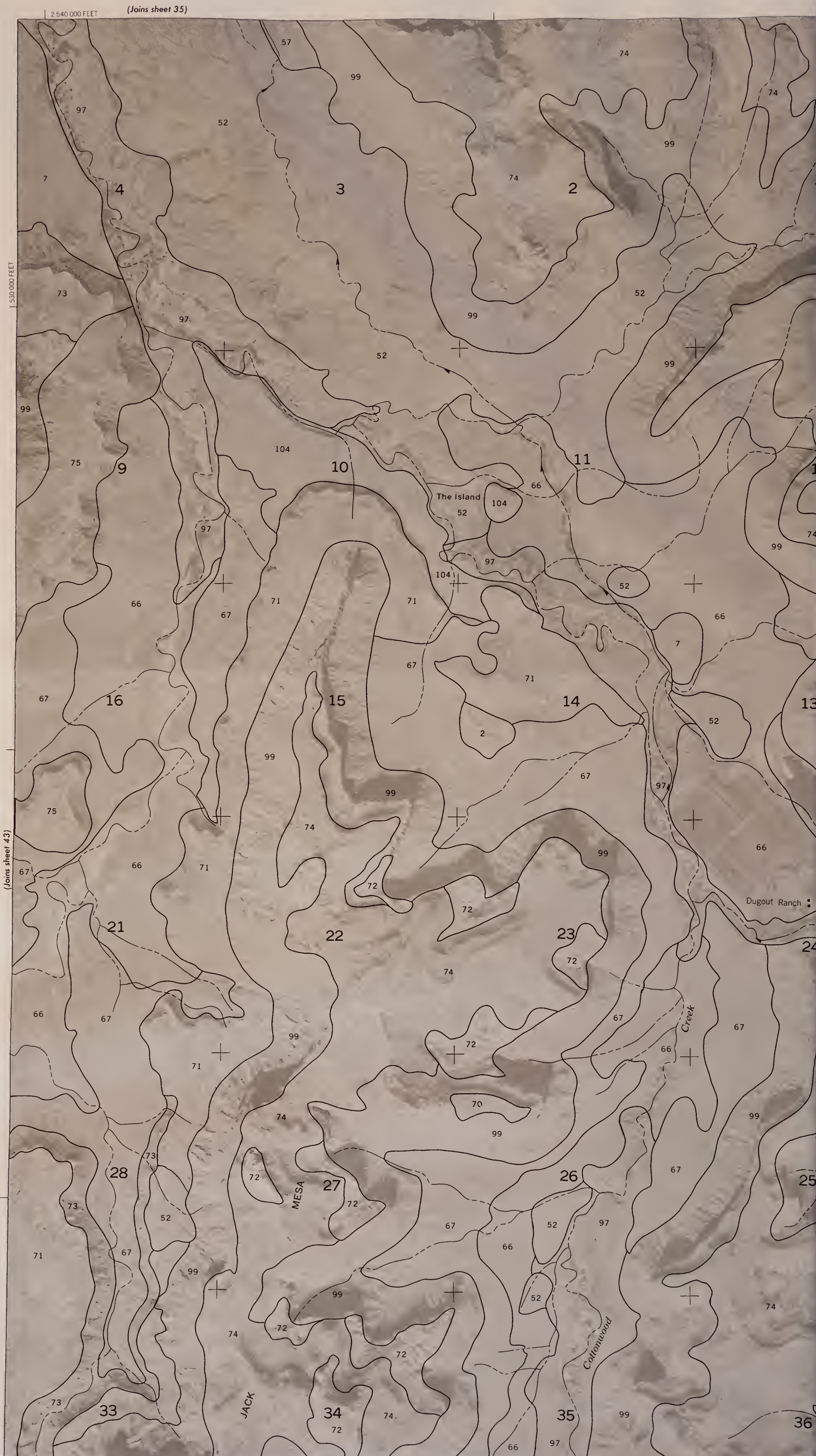
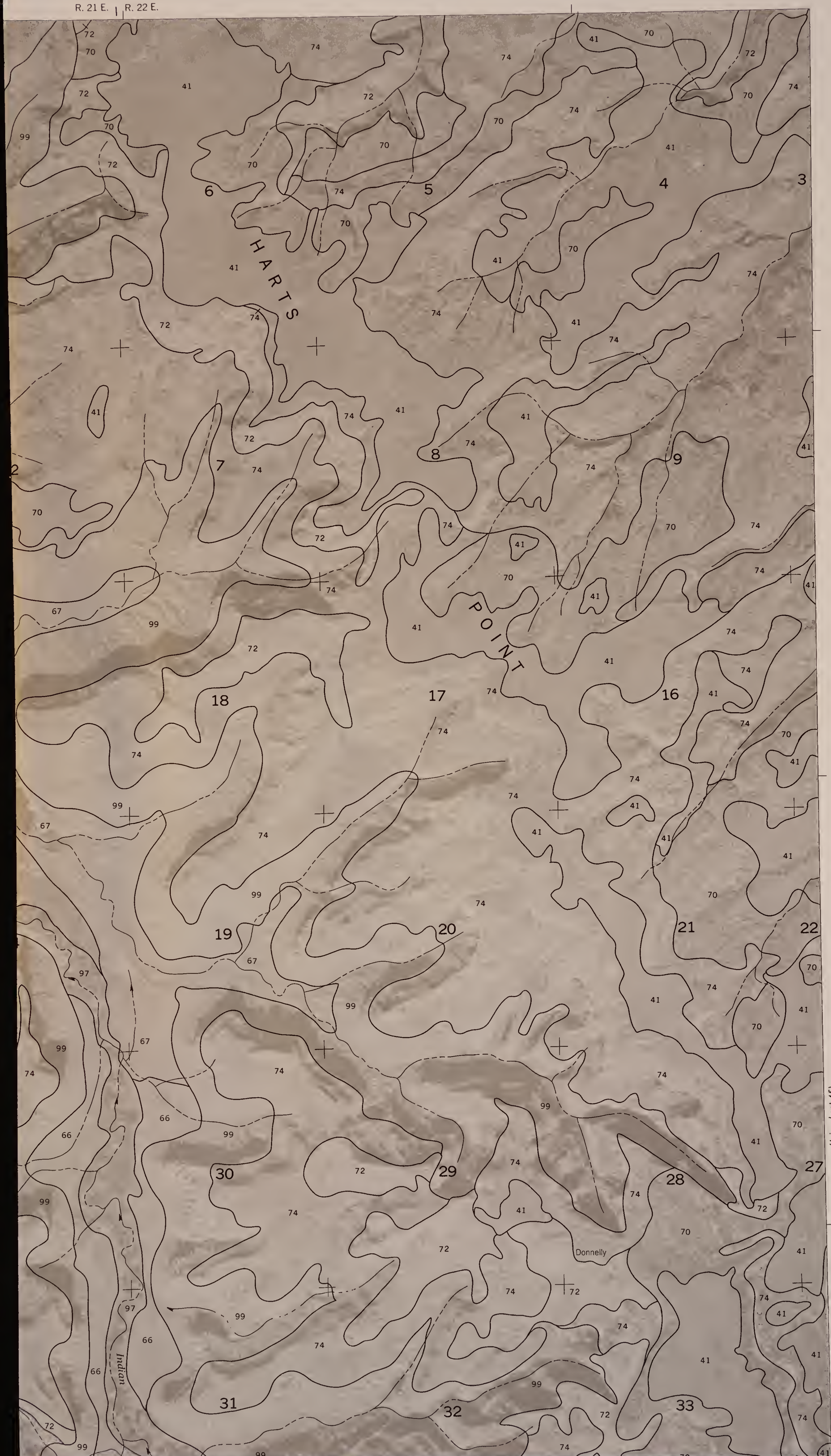
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

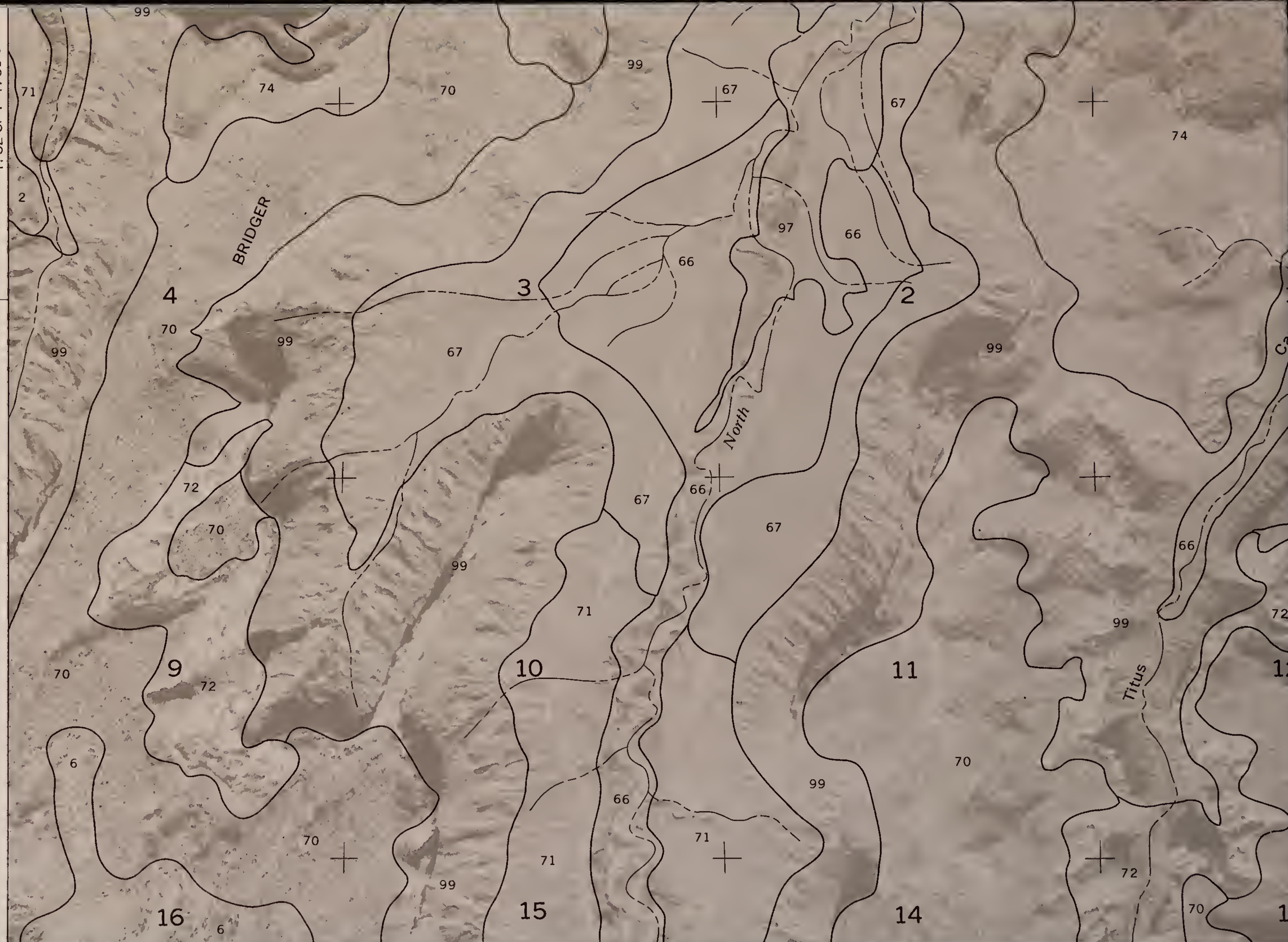
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO.44

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





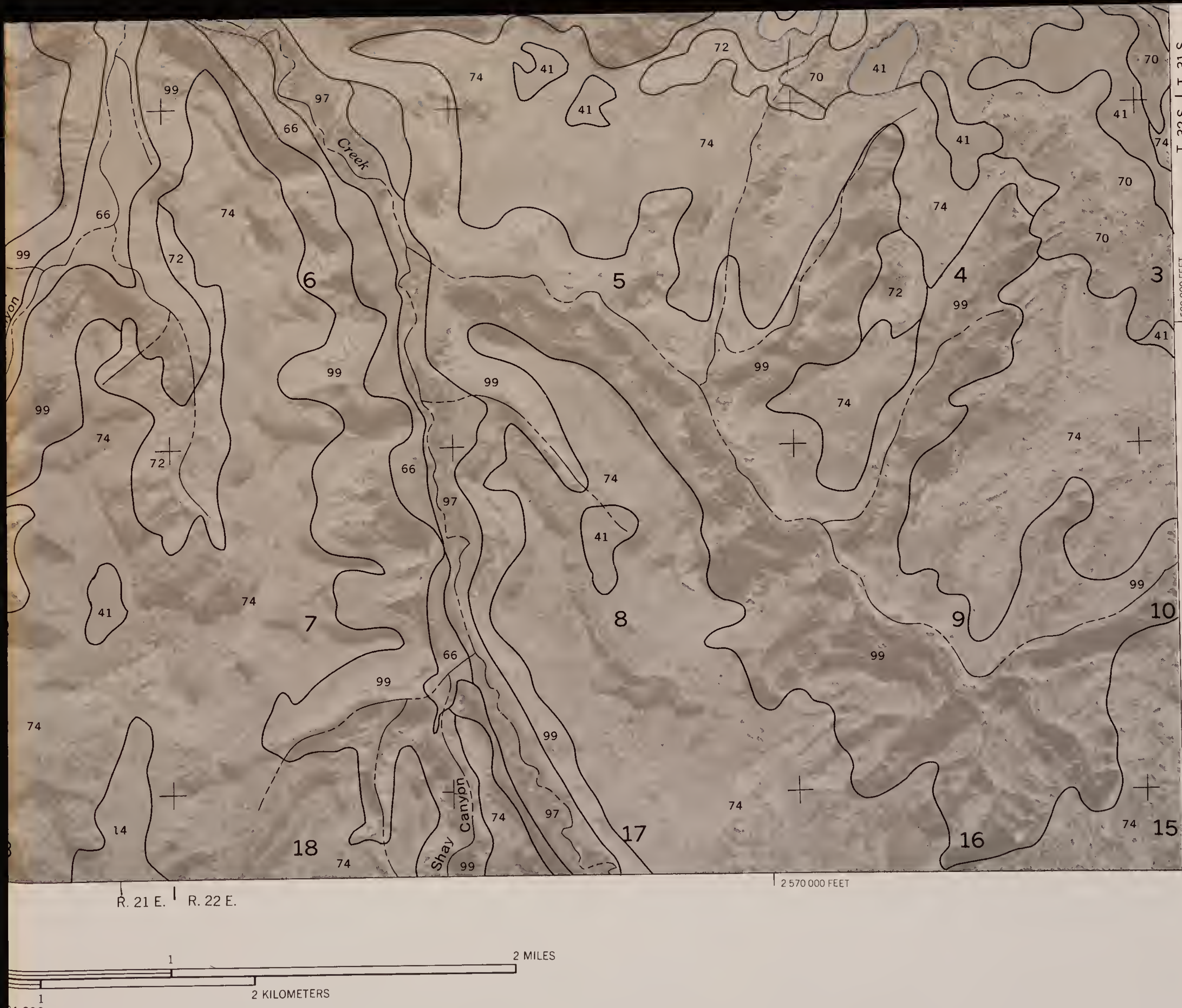
(Joins sheet 54)

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



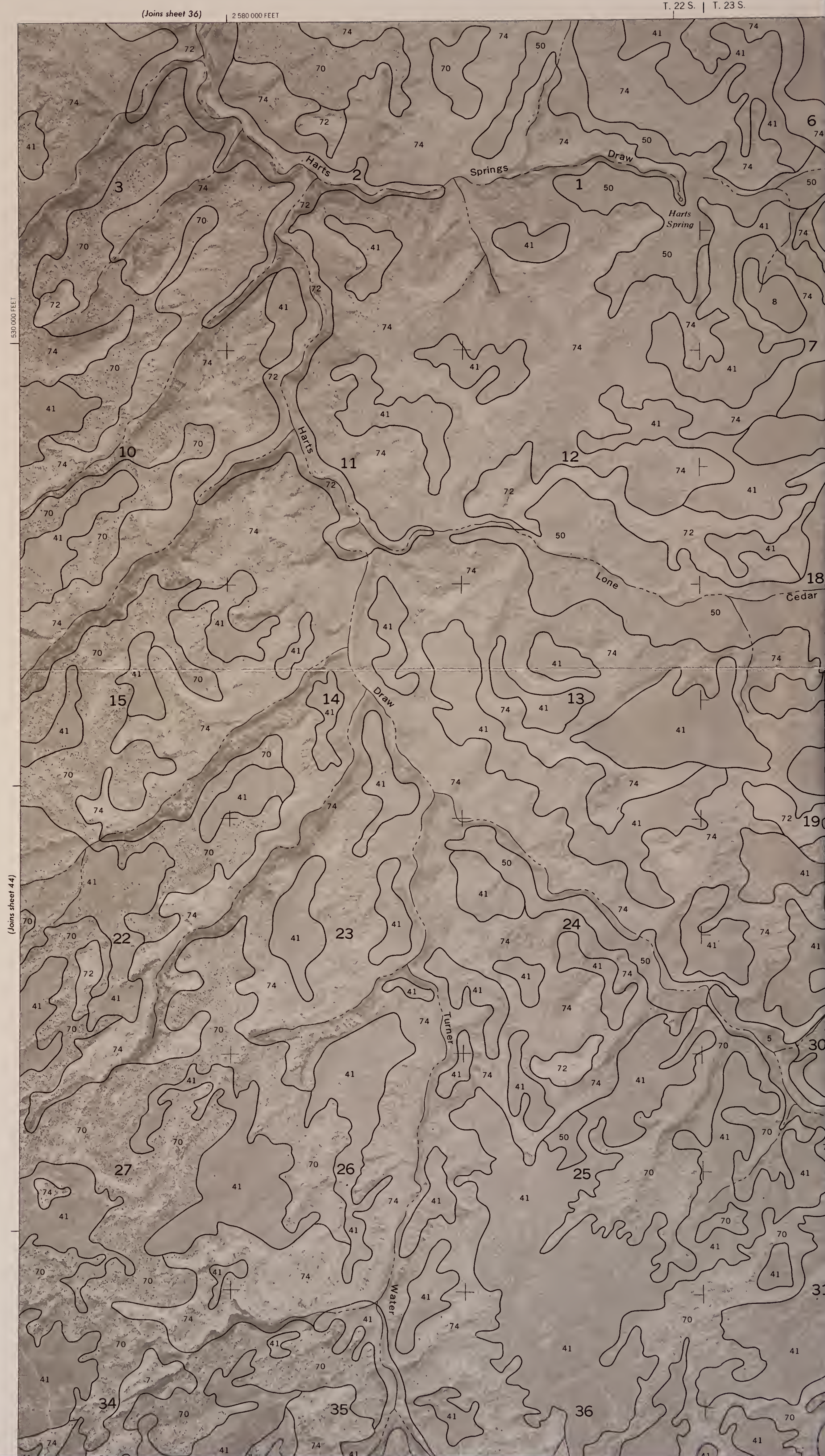
Creek
Shay Canyon
yon
T. 32 S. | T. 31 S.
500 000 FEET
2 570 000 FEET
R. 21 E. | R. 22 E.
3
4
5
6
7
8
9
10
15
16
17
18
1
2 MILES
1
2 KILOMETERS
24 000

#24363150 ID 88071562

This soil survey map was compiled by the U S. Department of Agriculture, Soil Conservation Service, and cooperating agencies Base maps are orthophotographs prepared by the U S Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography Coordinate grid ticks and land division corners, if shown, are approximately positioned

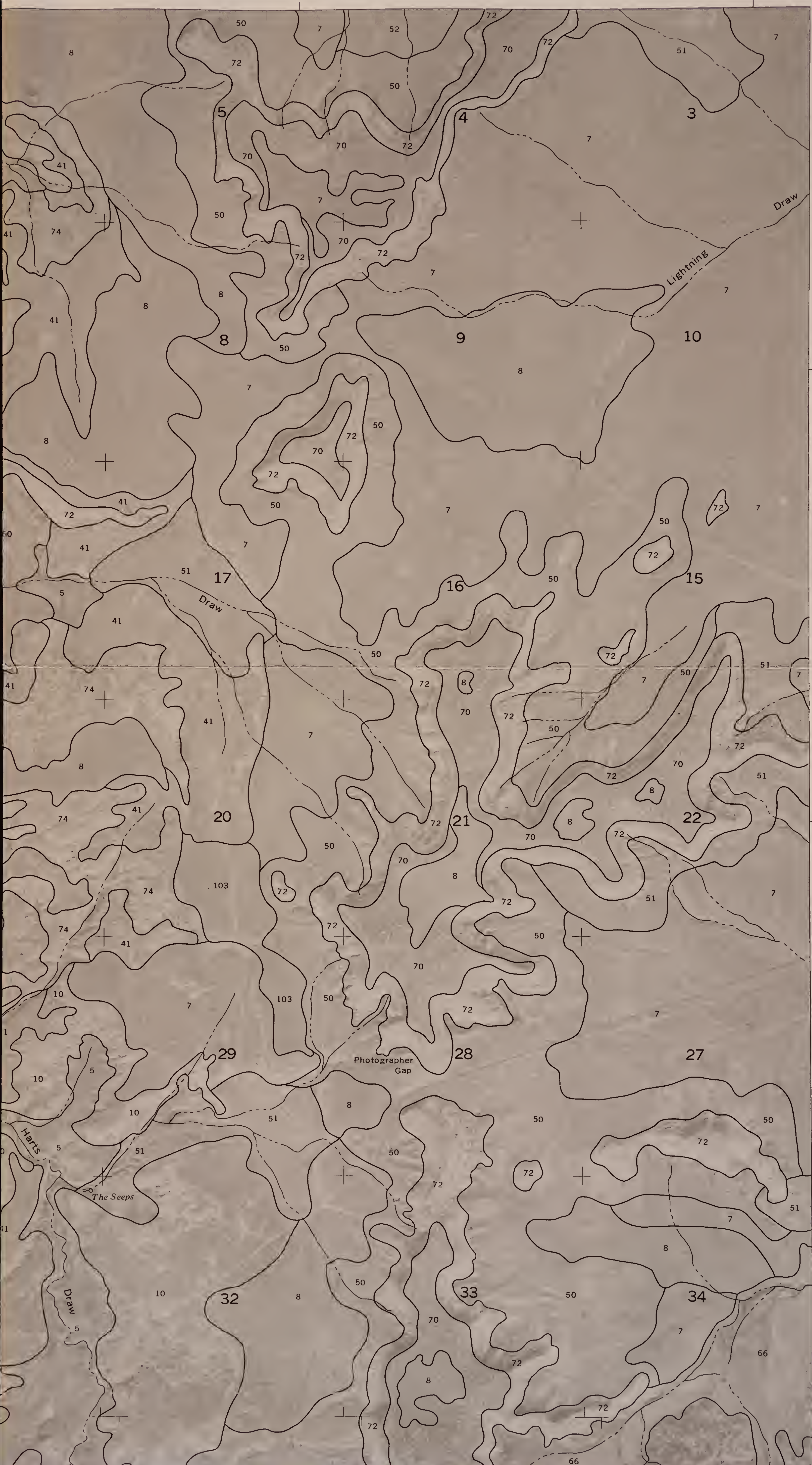
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

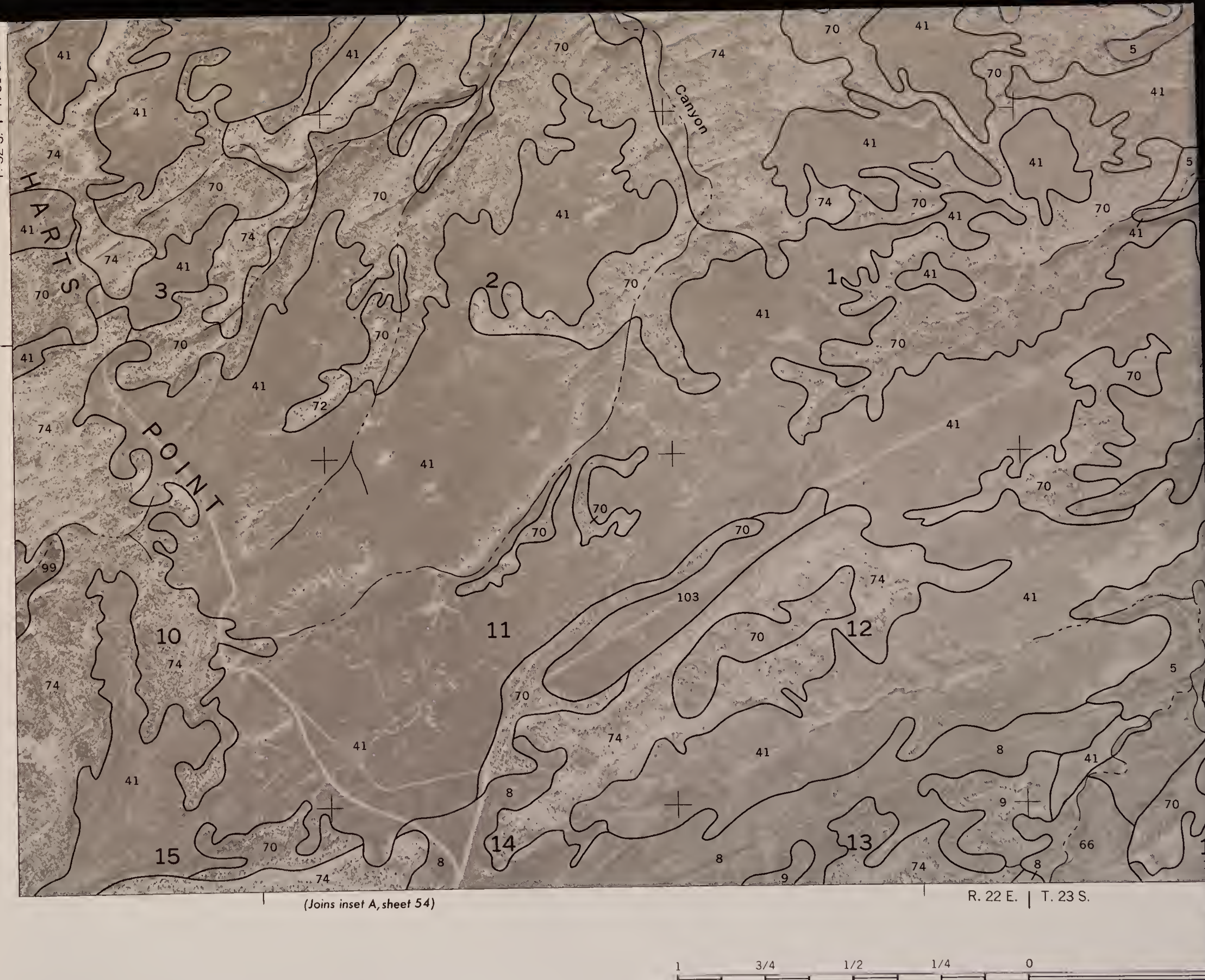
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



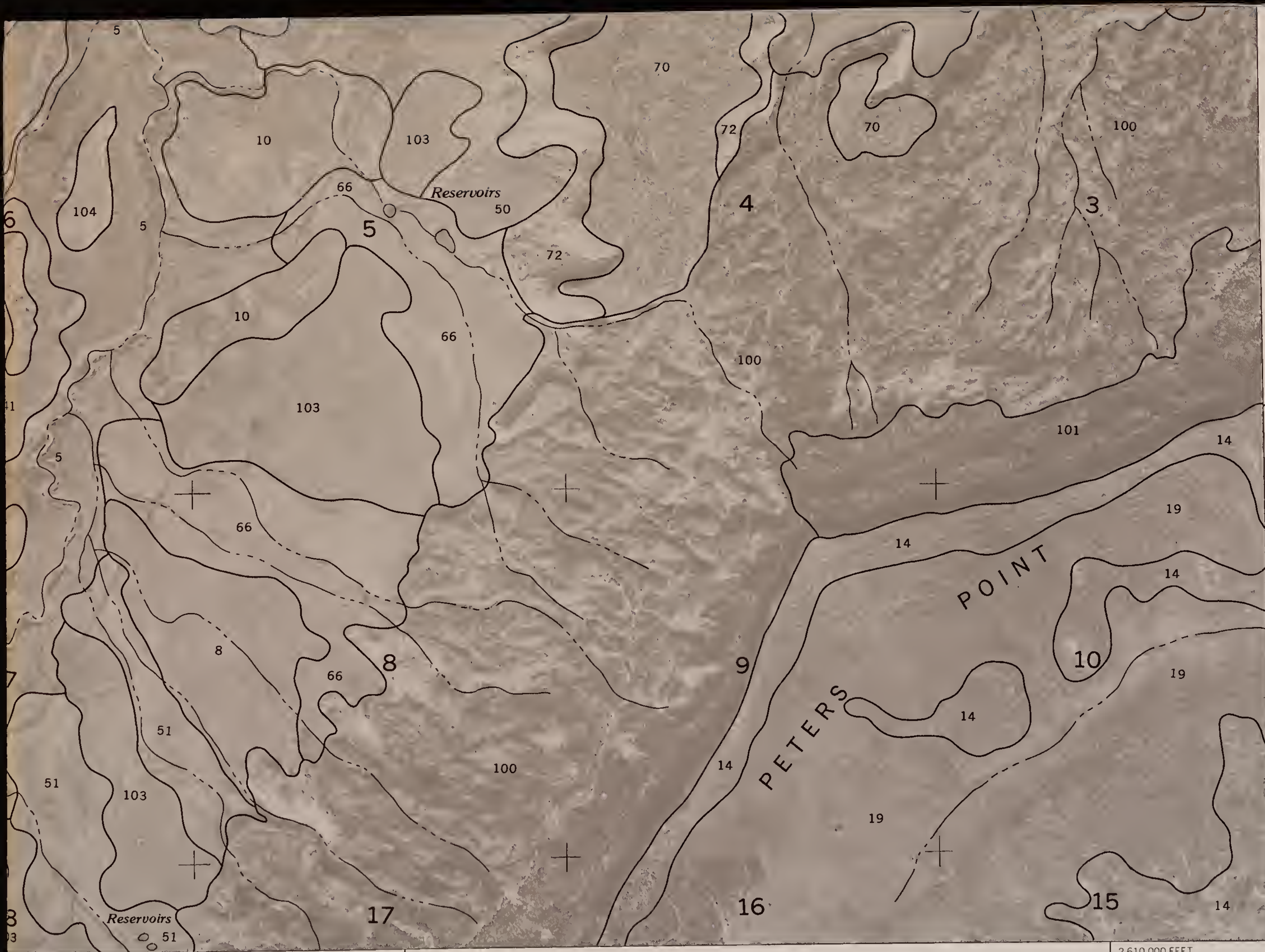
SHEET NO. 45

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

1 2 KILOMETERS

4 000

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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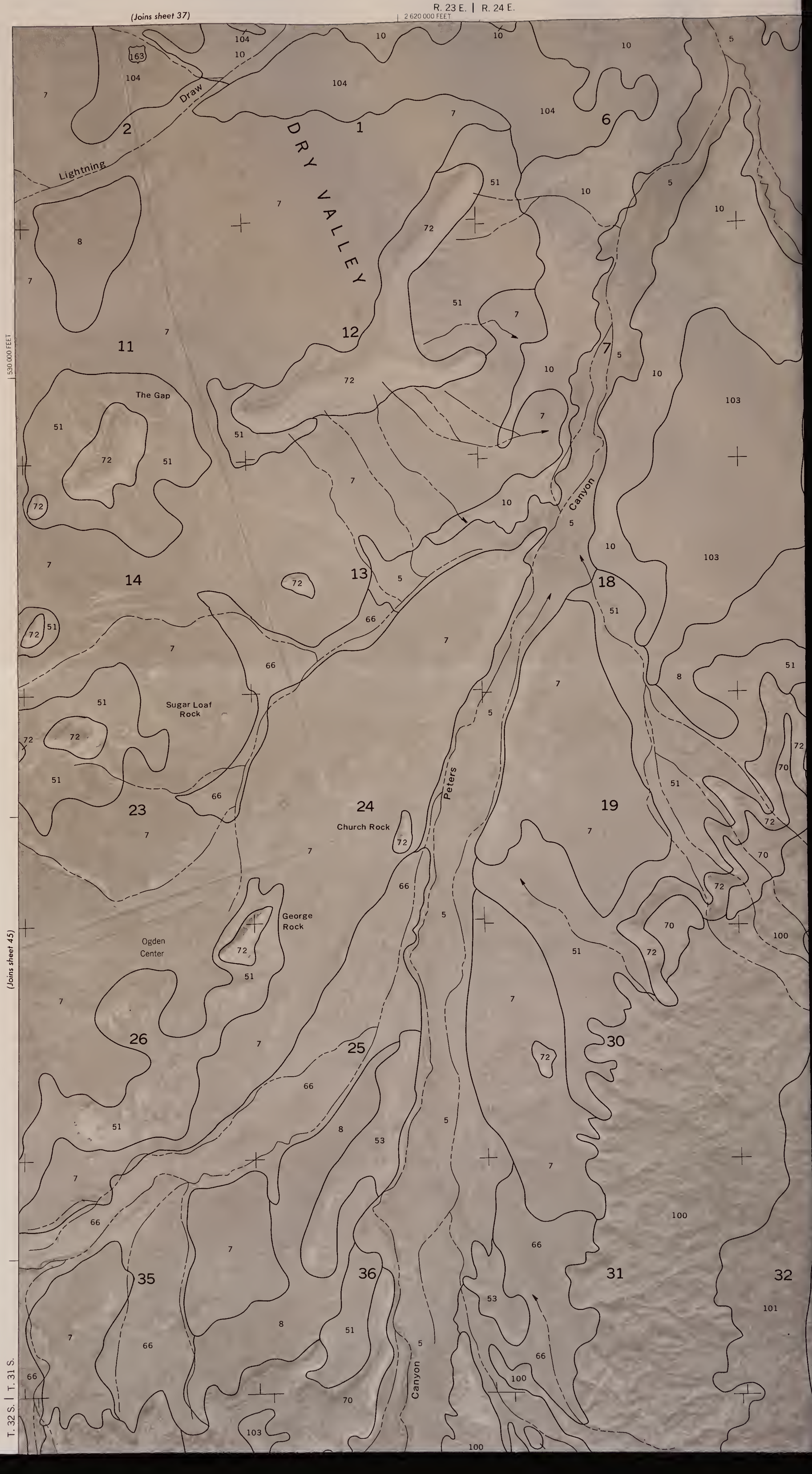
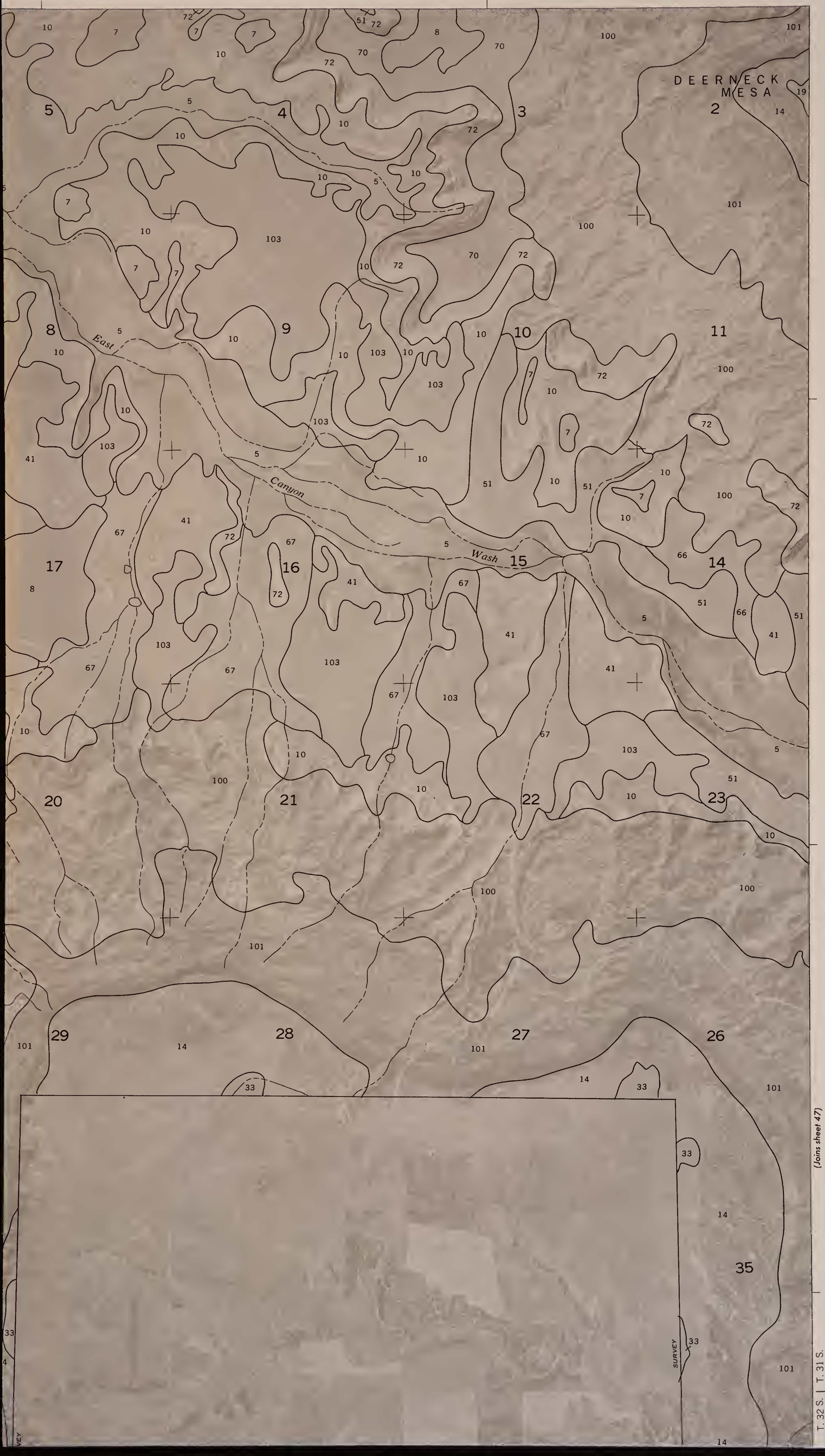
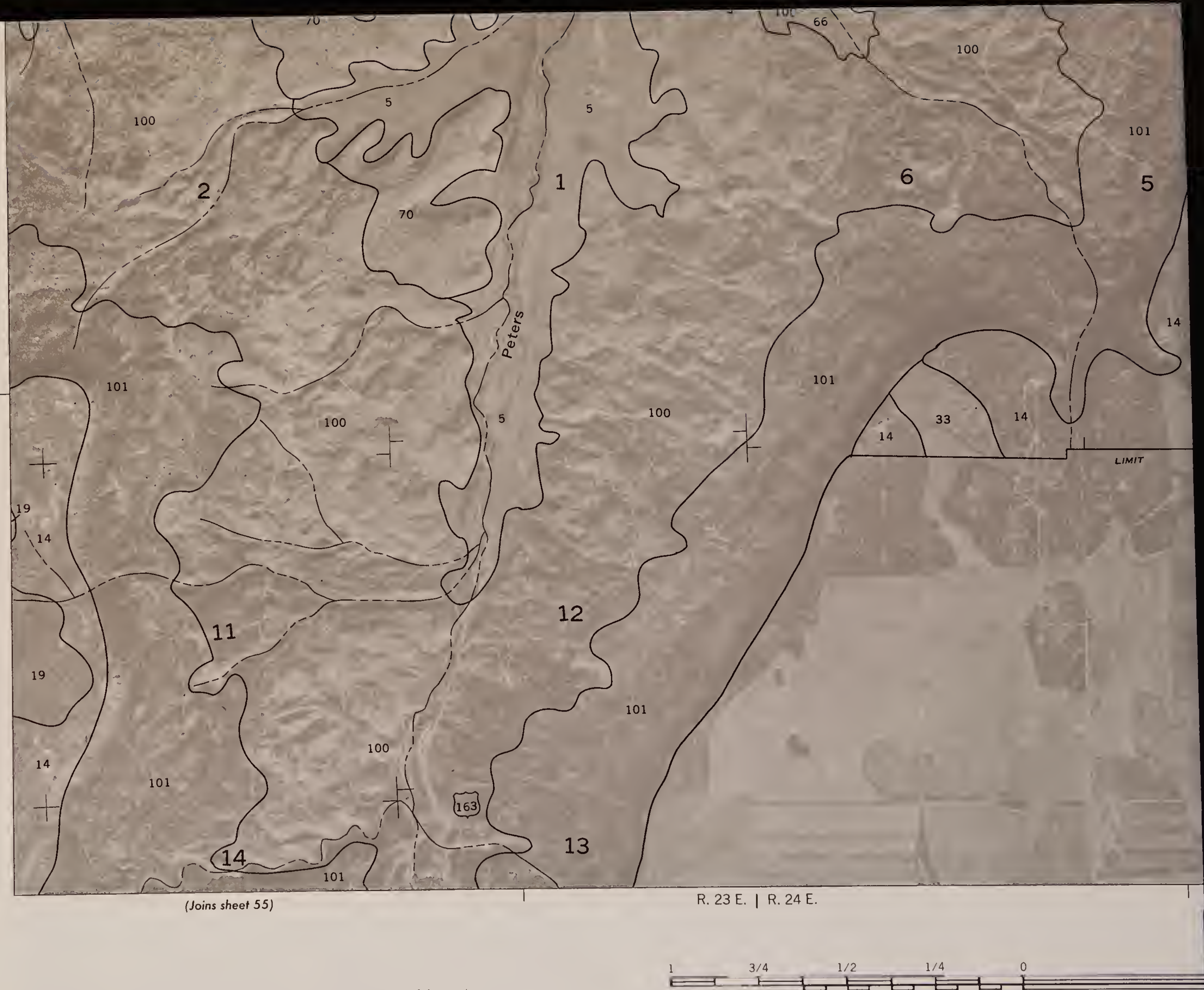
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

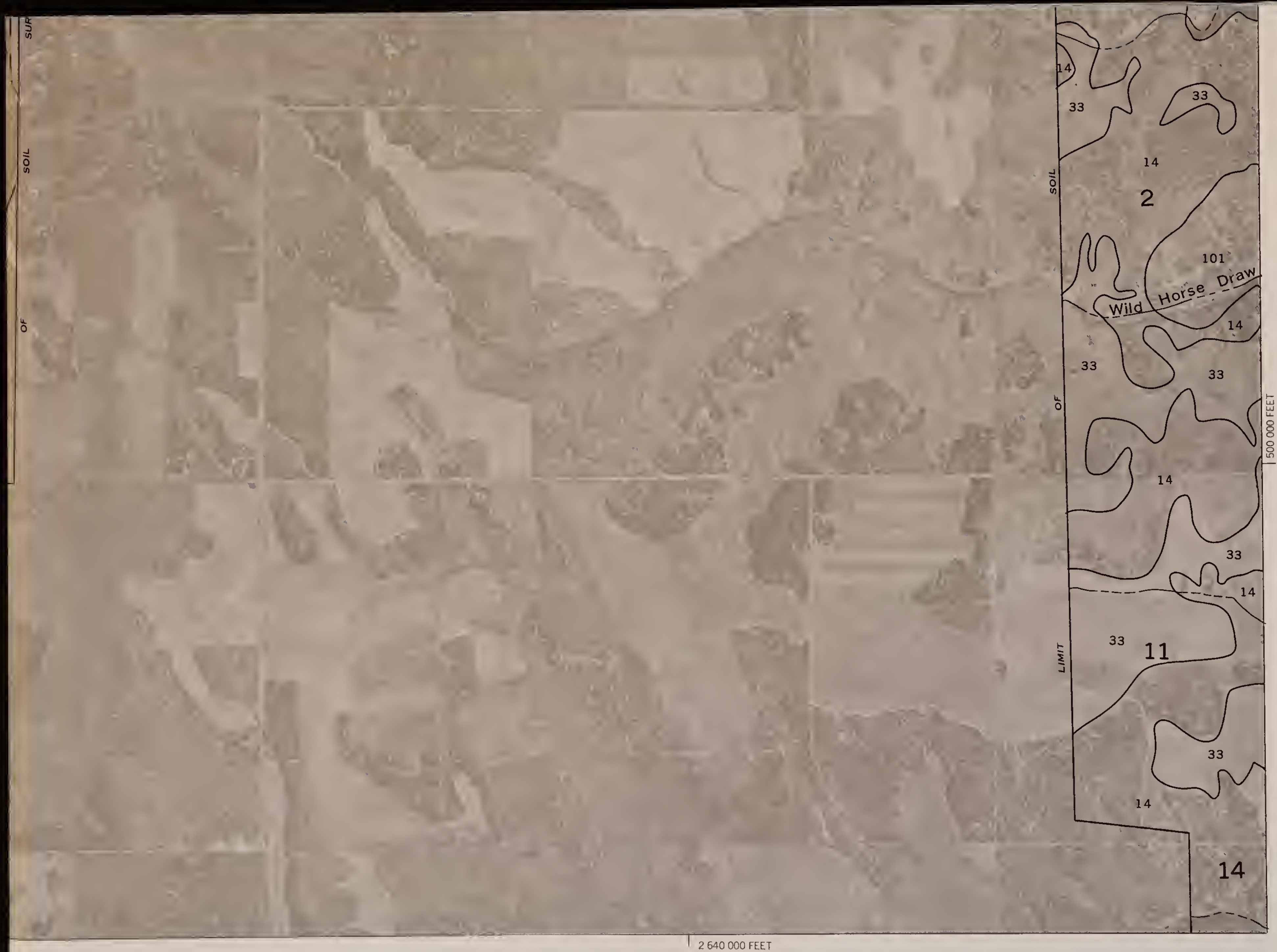


SHEET NO. 46
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1
2 MILES
1
2 KILOMETERS
24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

#24363150 ID:88071562

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

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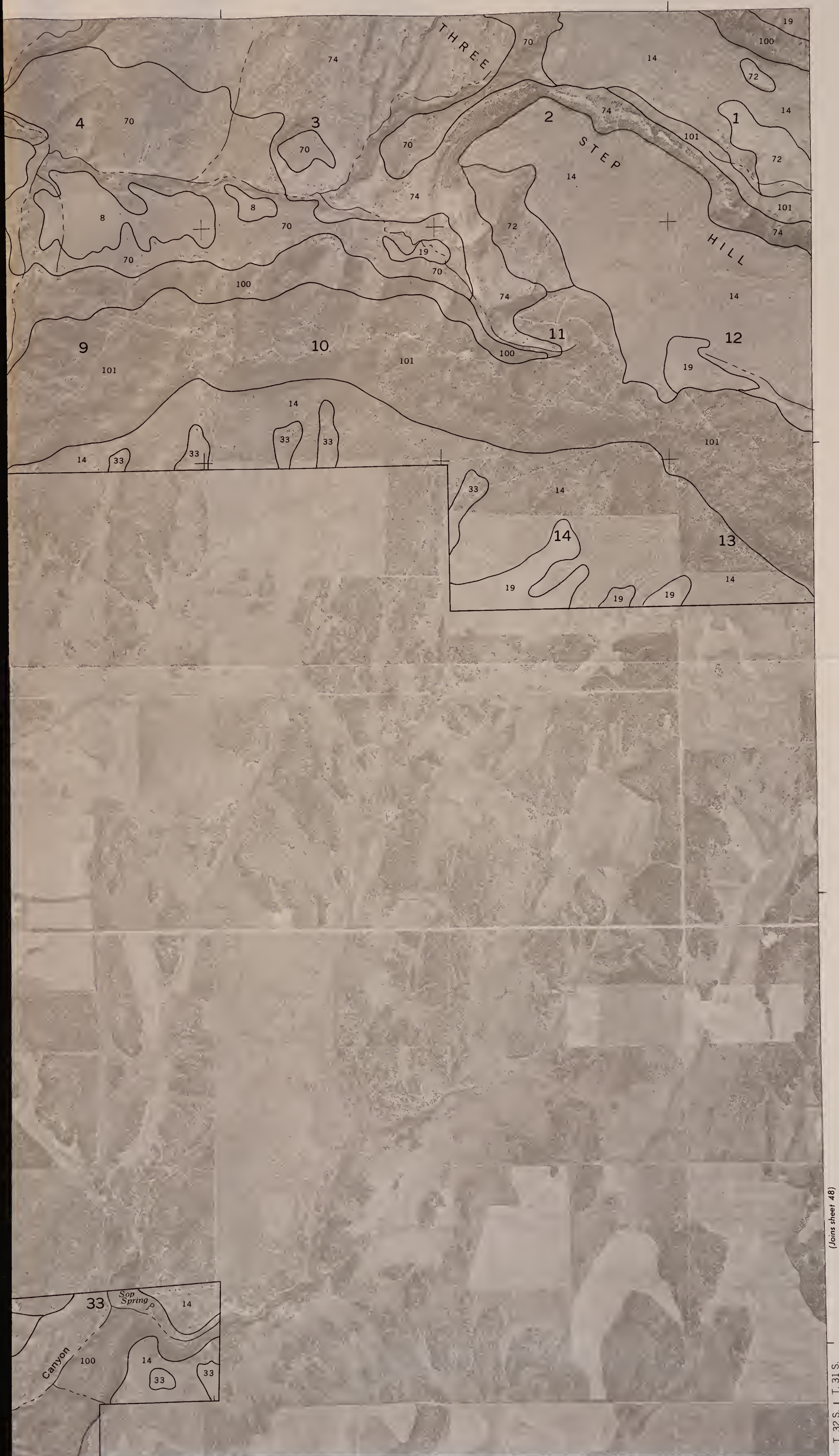
SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



(Joins inset A, sheet 55)

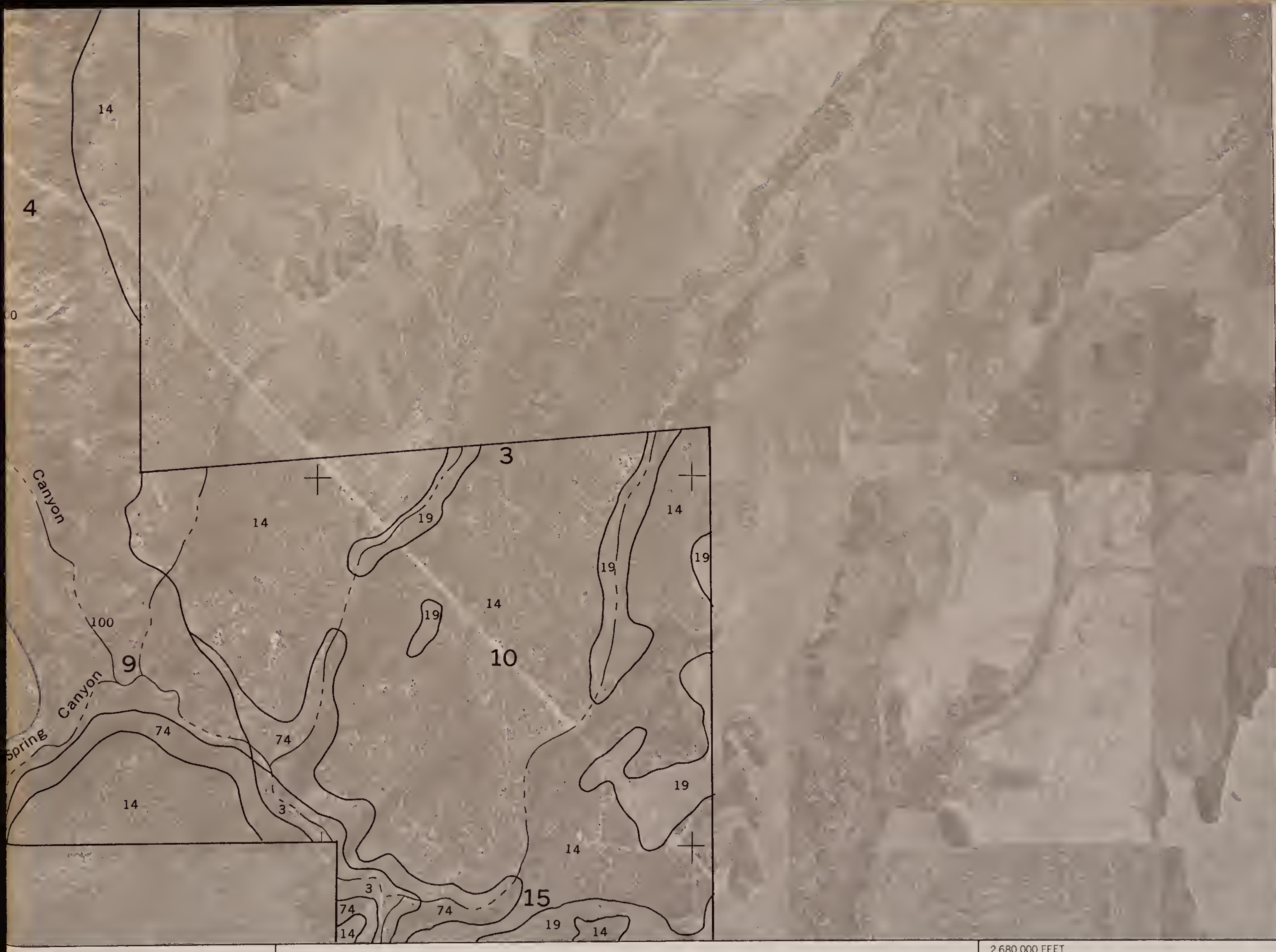
R. 24 E. | R. 25 E.

1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

1 2 KILOMETERS

24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

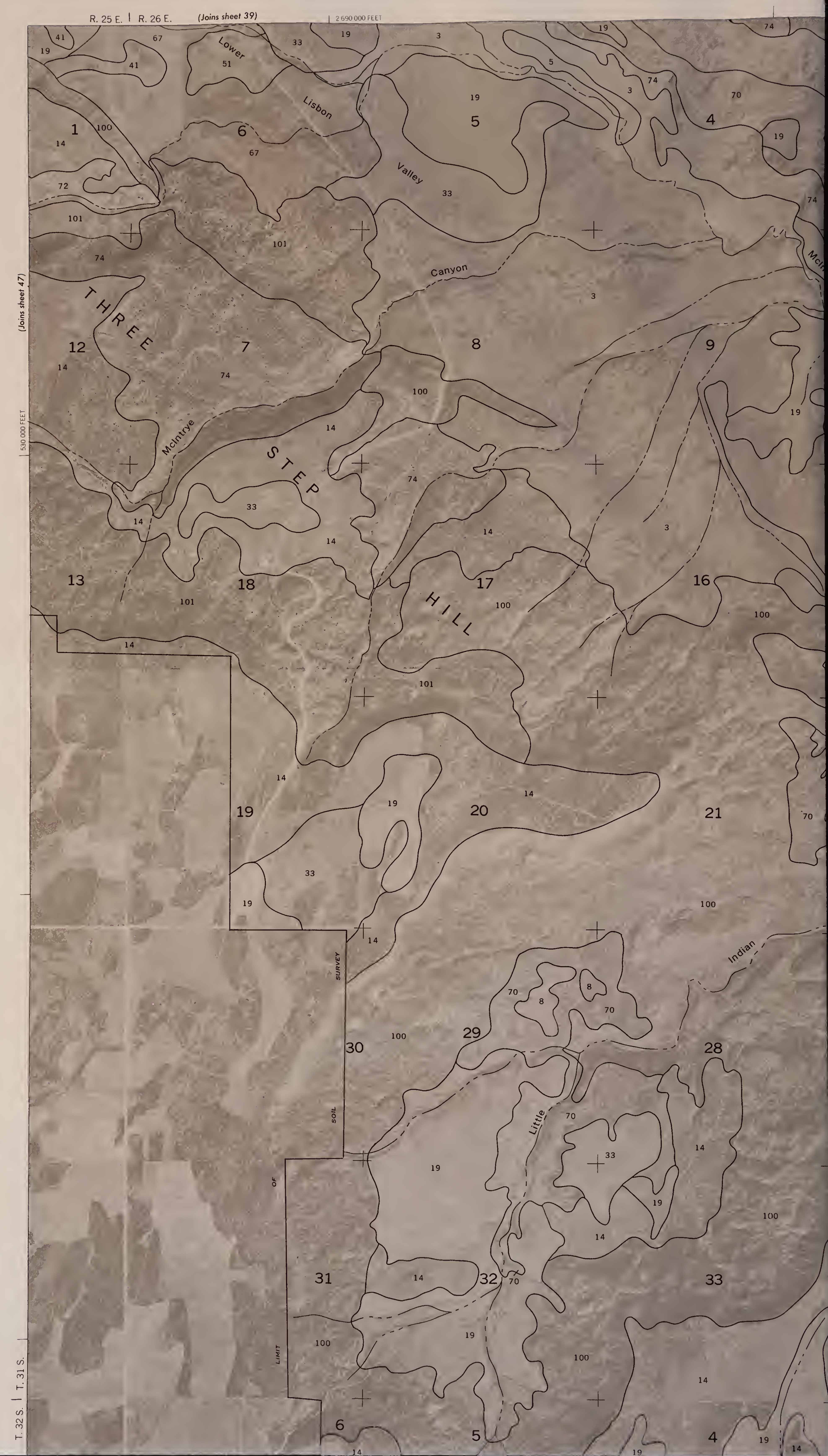
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 48

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

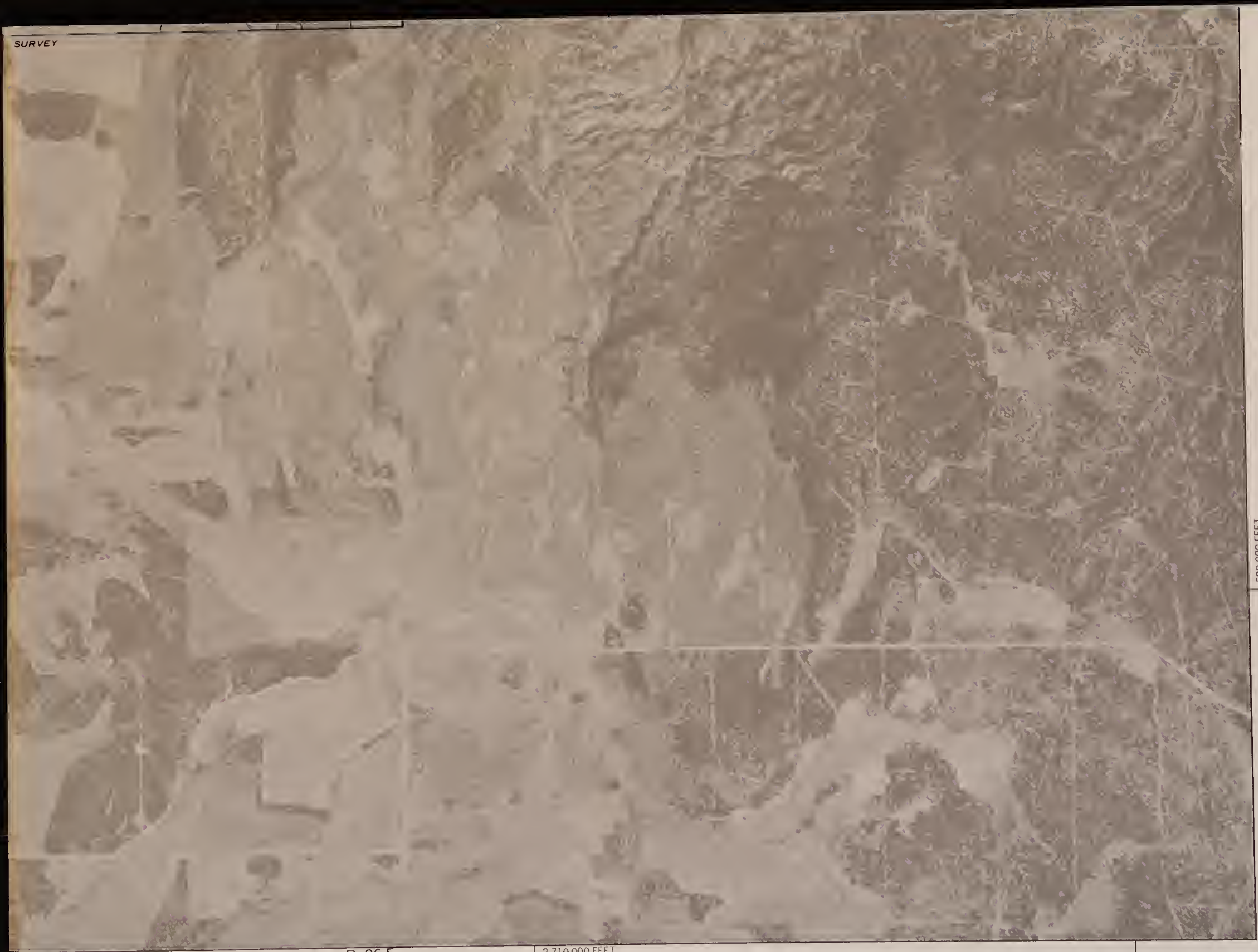
1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS OF



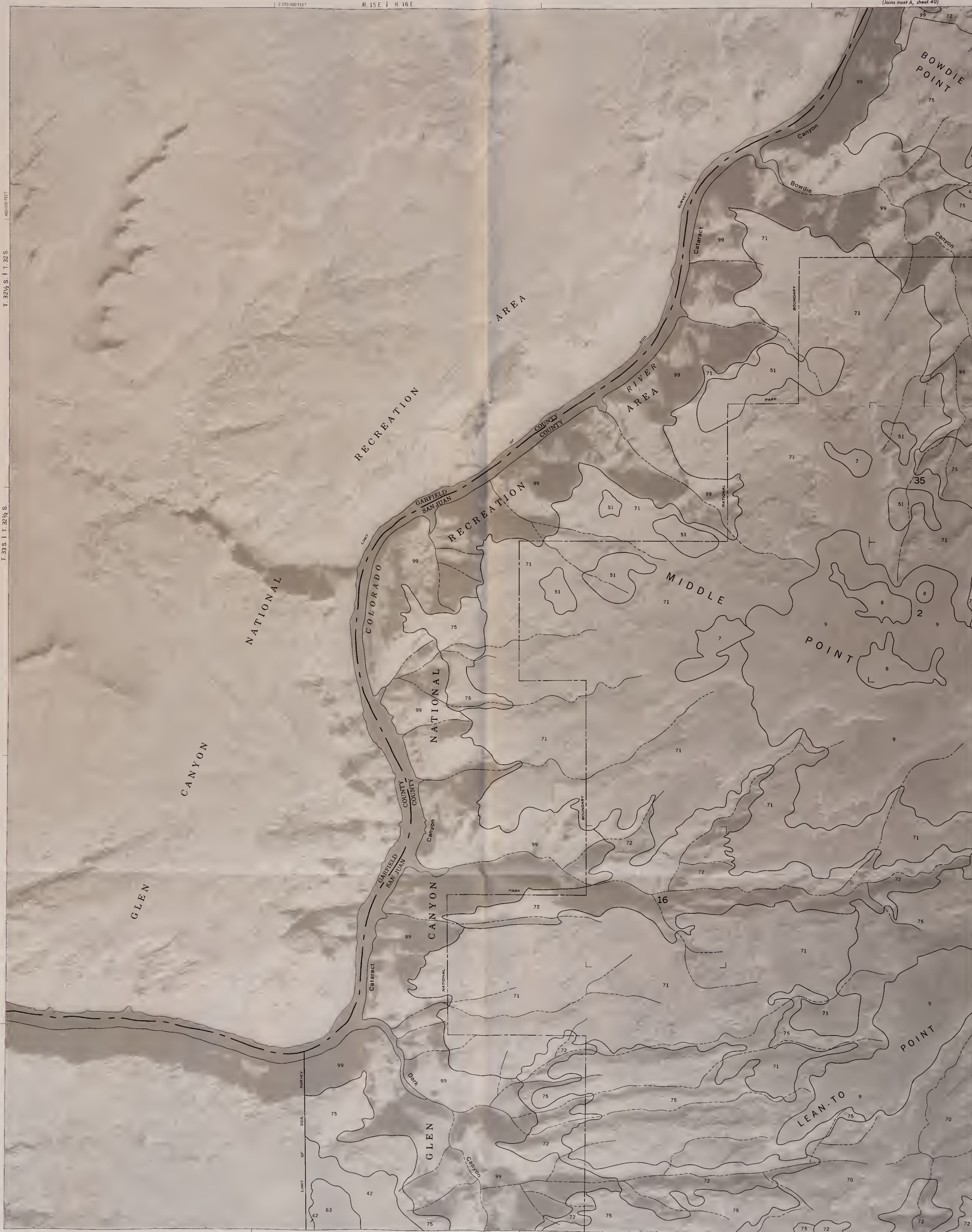
1
2 MILES
1
2 KILOMETERS
4 000

RAND AND SAN JUAN COUNTIES NO. 48

SHEET NO.48 OF 57

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

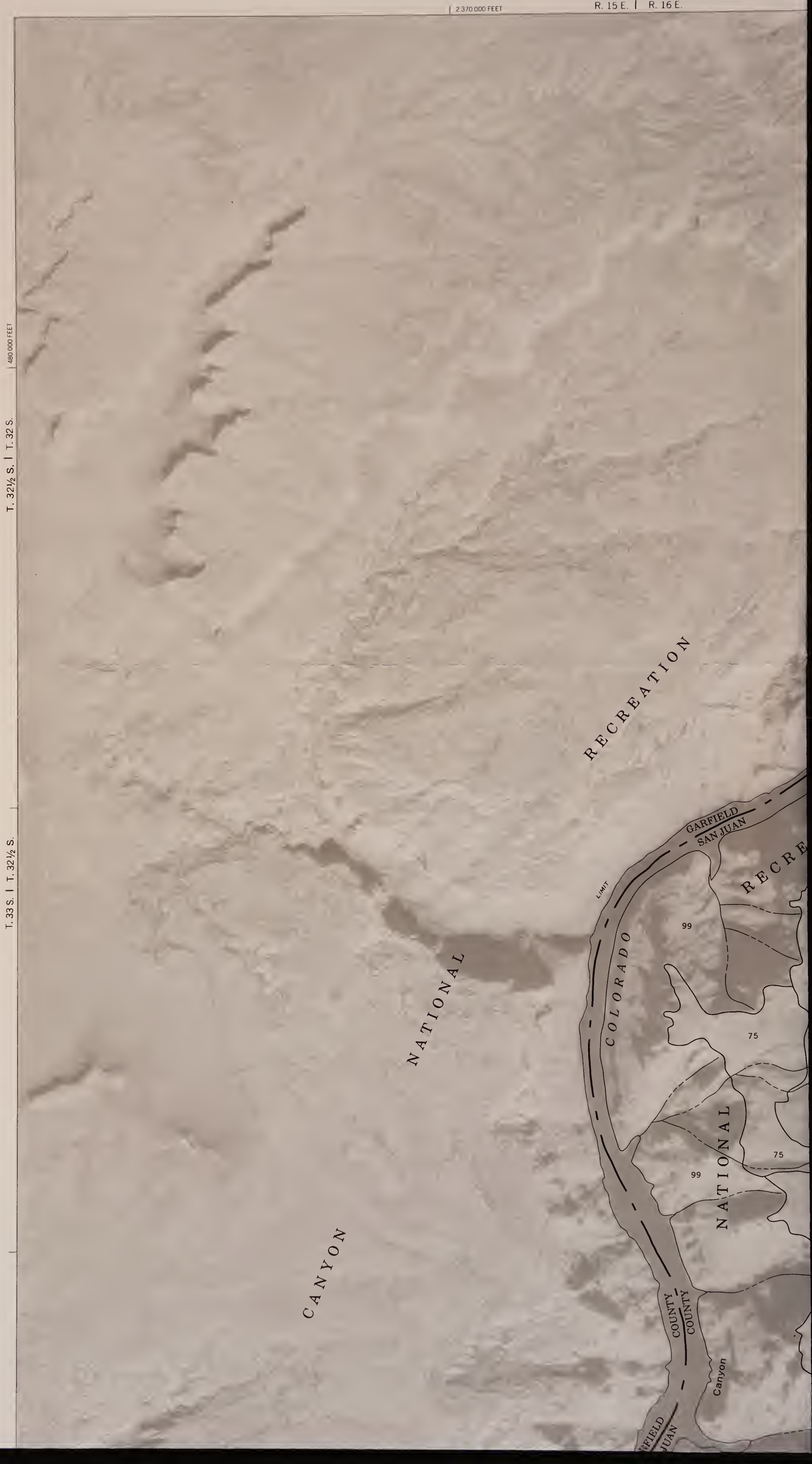
SHEET NO. 49
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

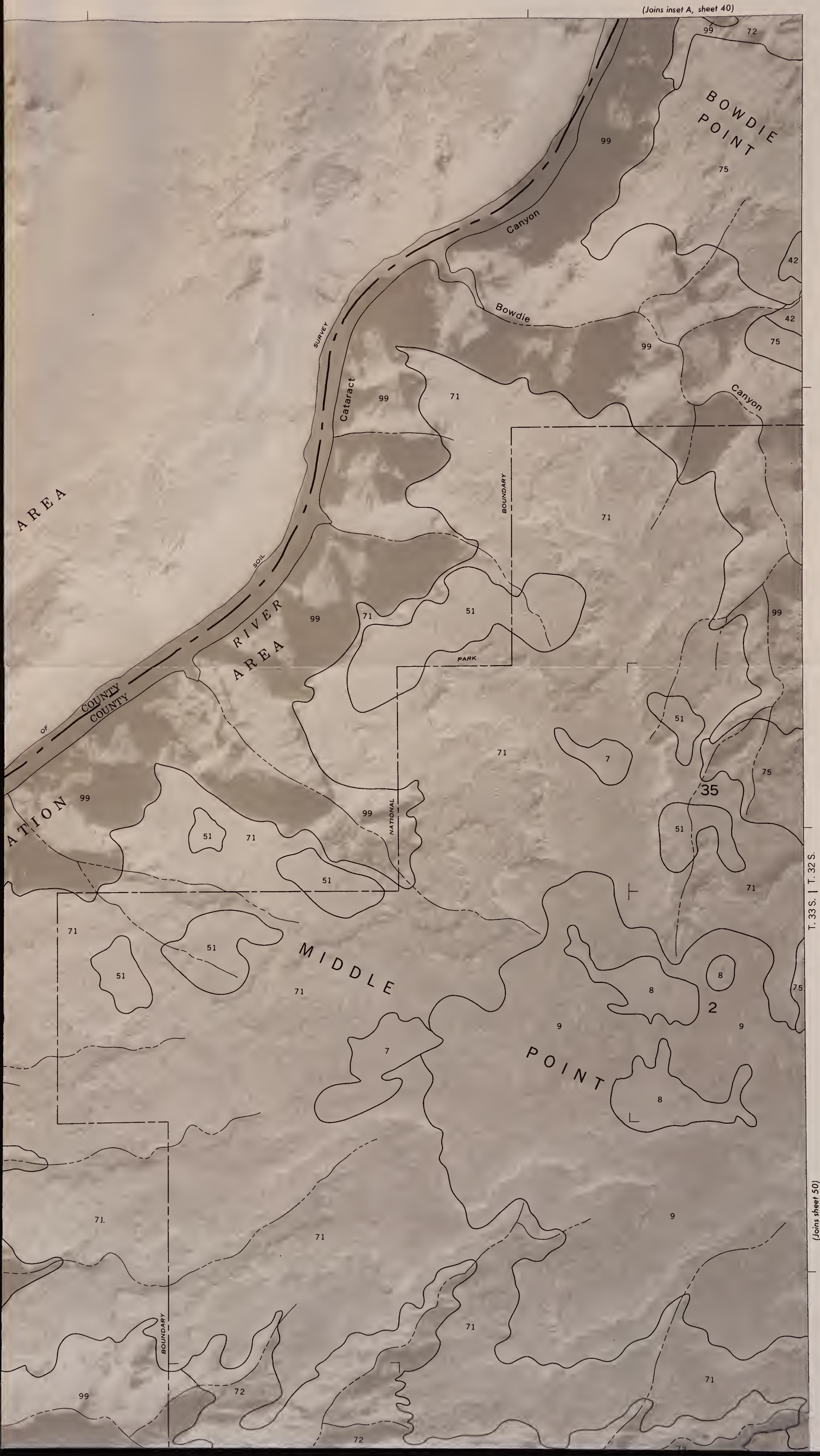
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 49

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



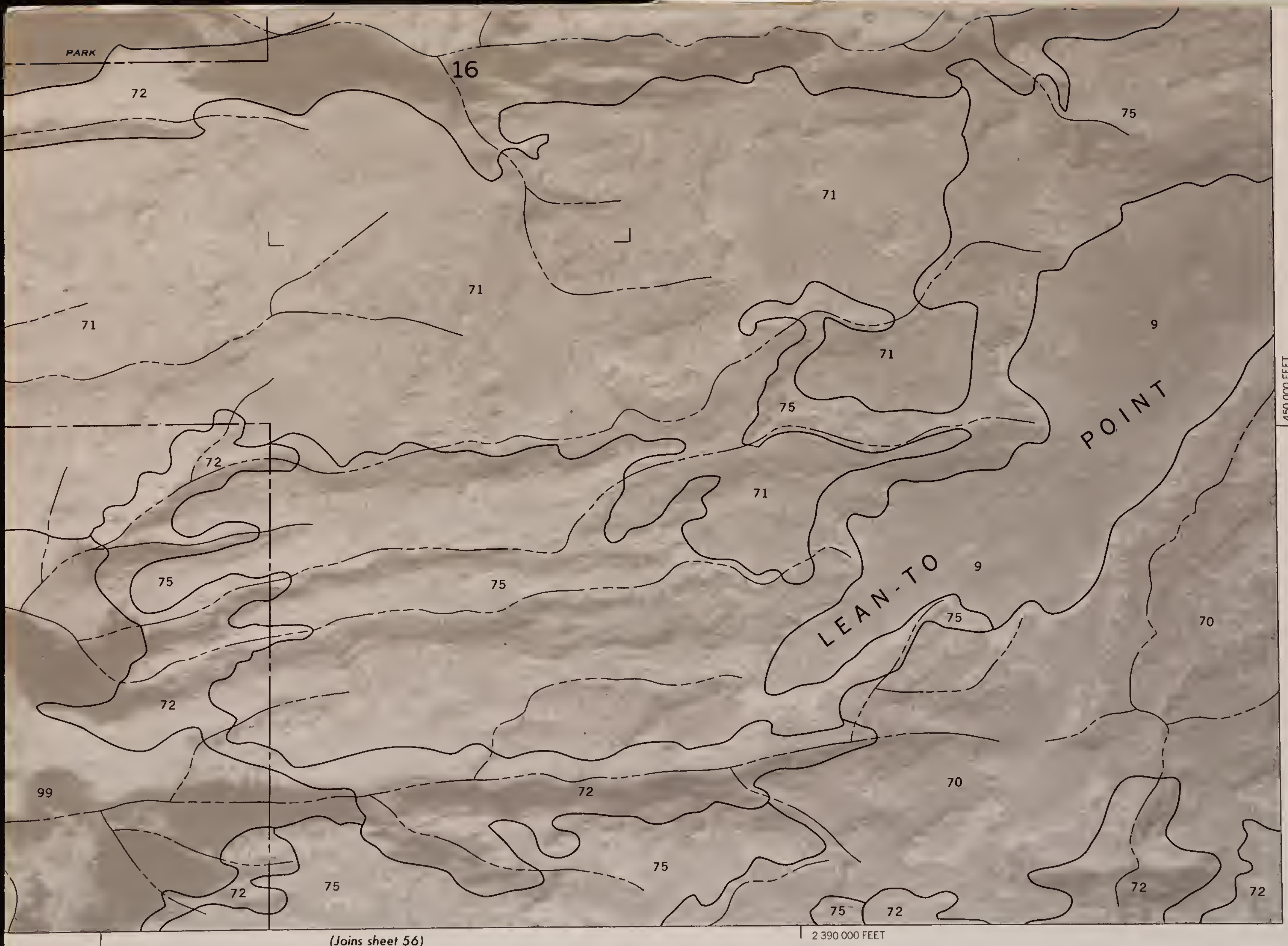
1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS OF



(Joins sheet 56)

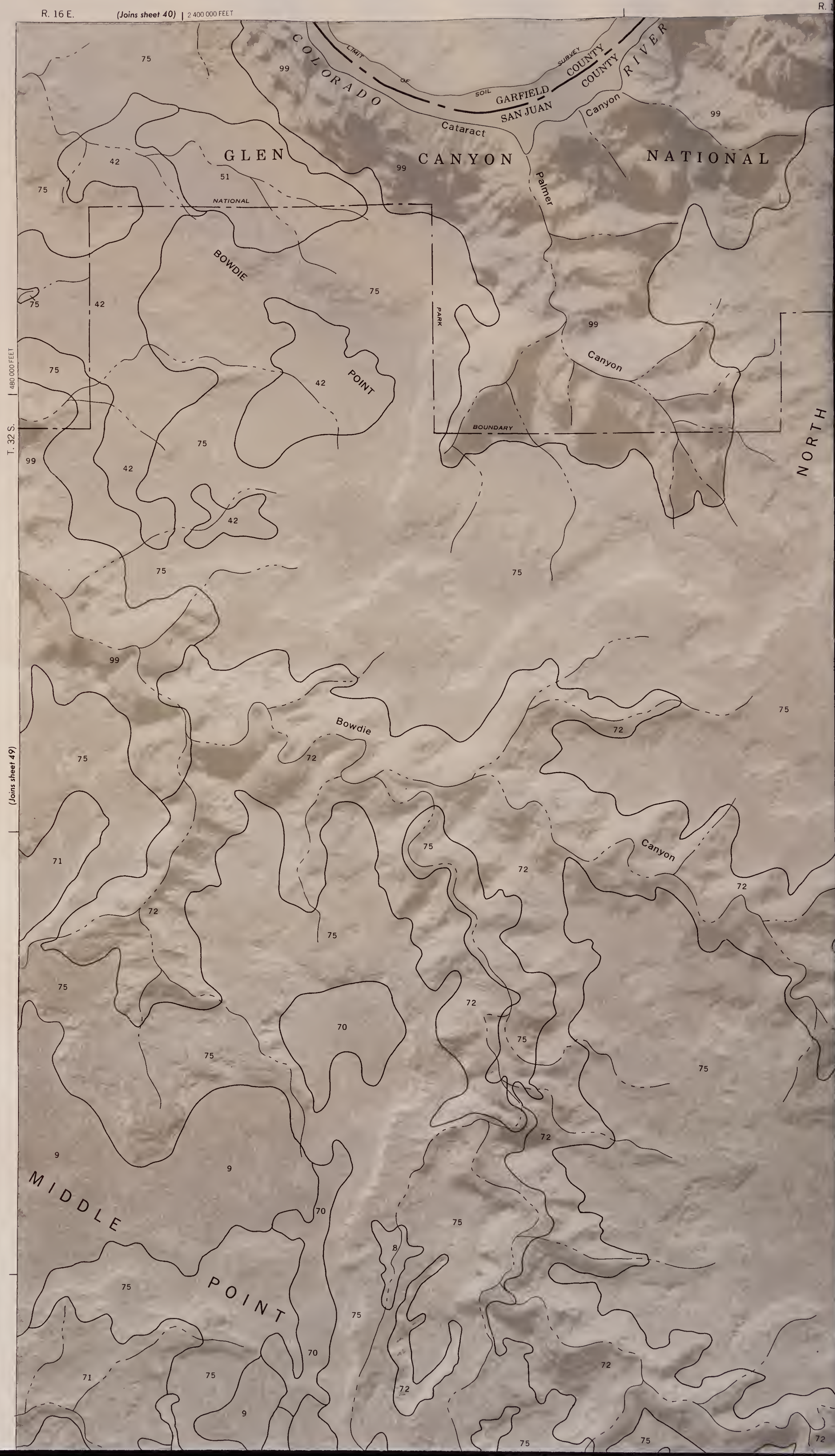
1 2 MILES

1 2 KILOMETERS

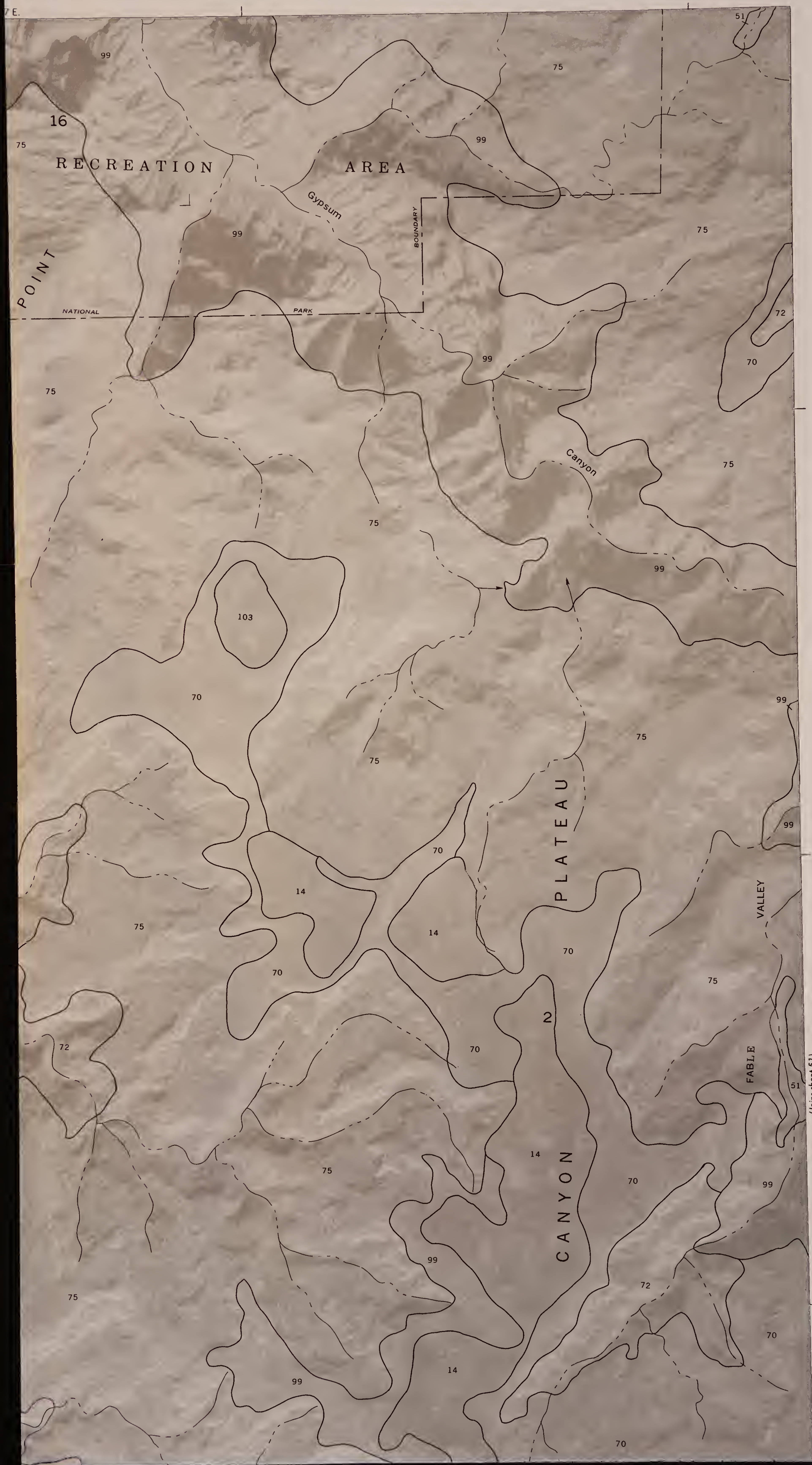
24 000

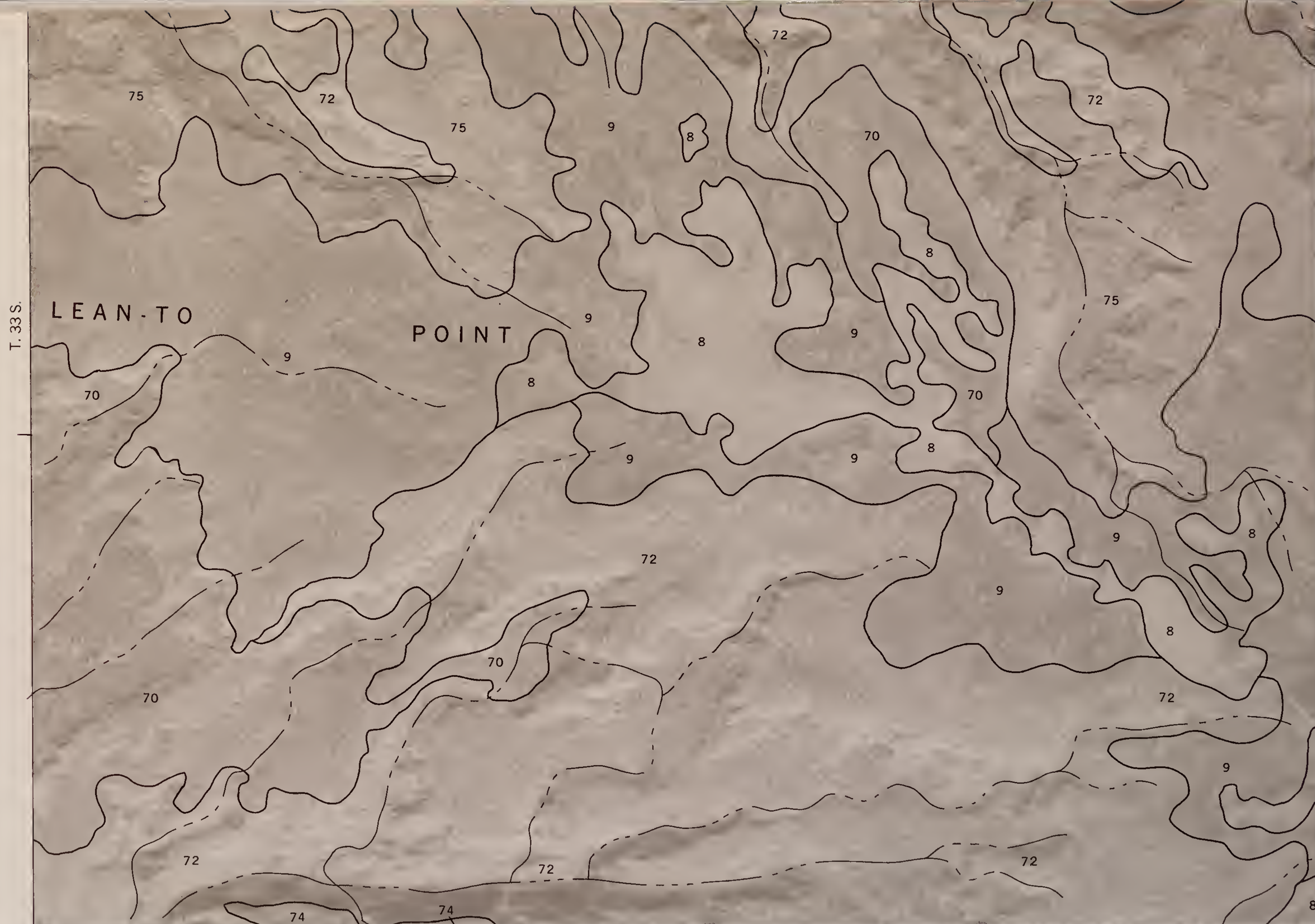
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 50
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





R. 16 E. (Joins sheet 57) R. 17

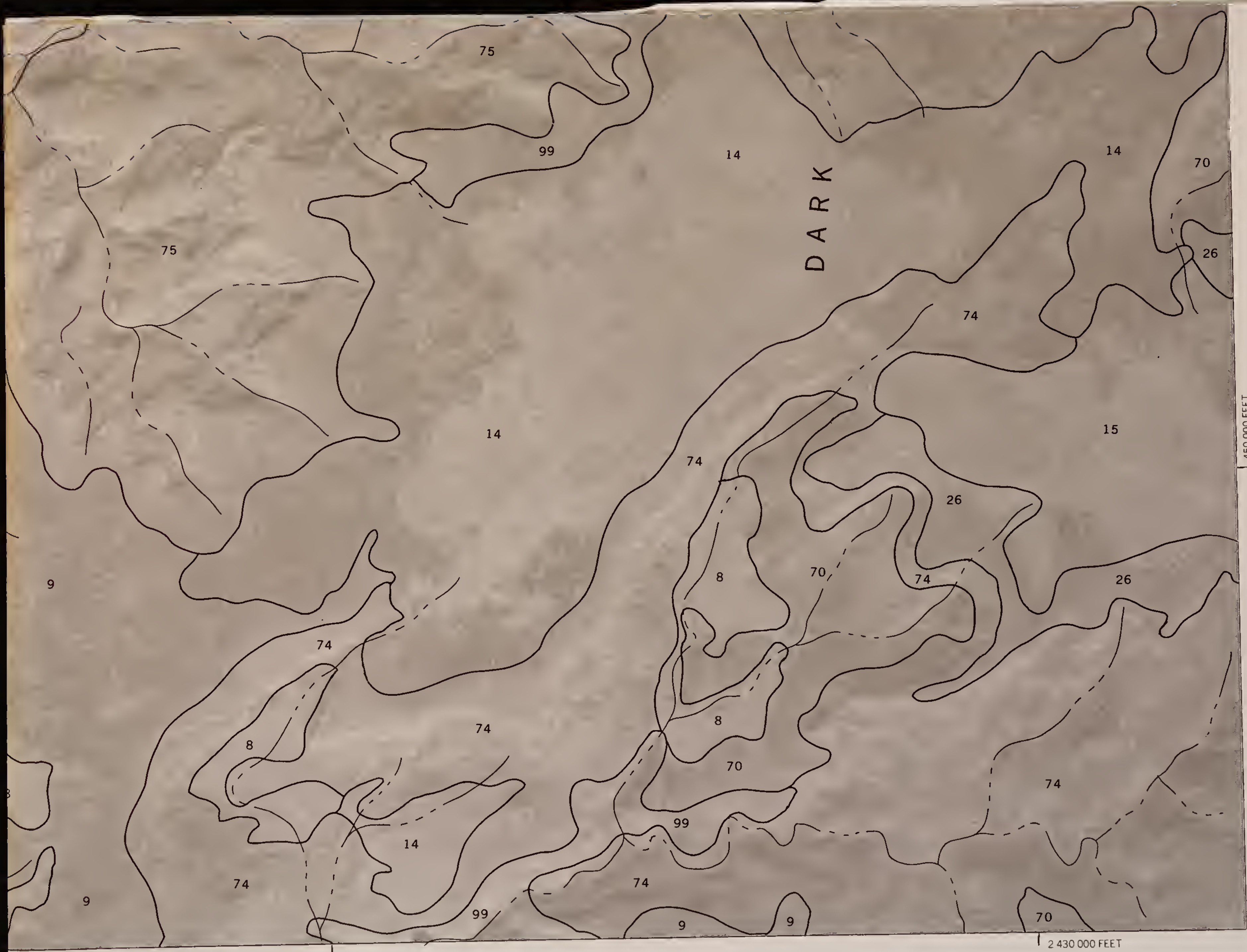
1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CANYONLANDS AREA, UTAH, PARTS OF GRAN



E.

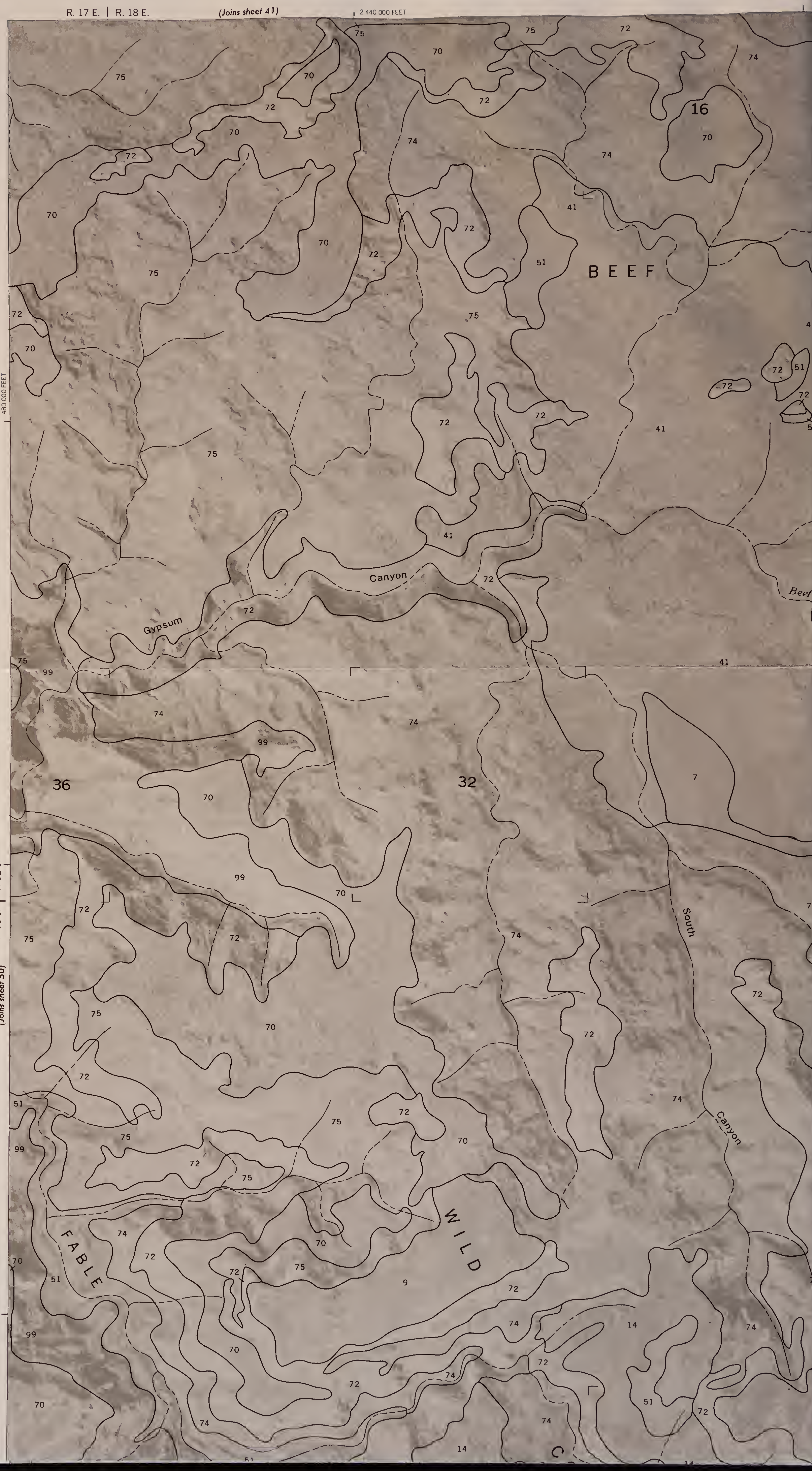
1 2 MILES

2 KILOMETERS

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

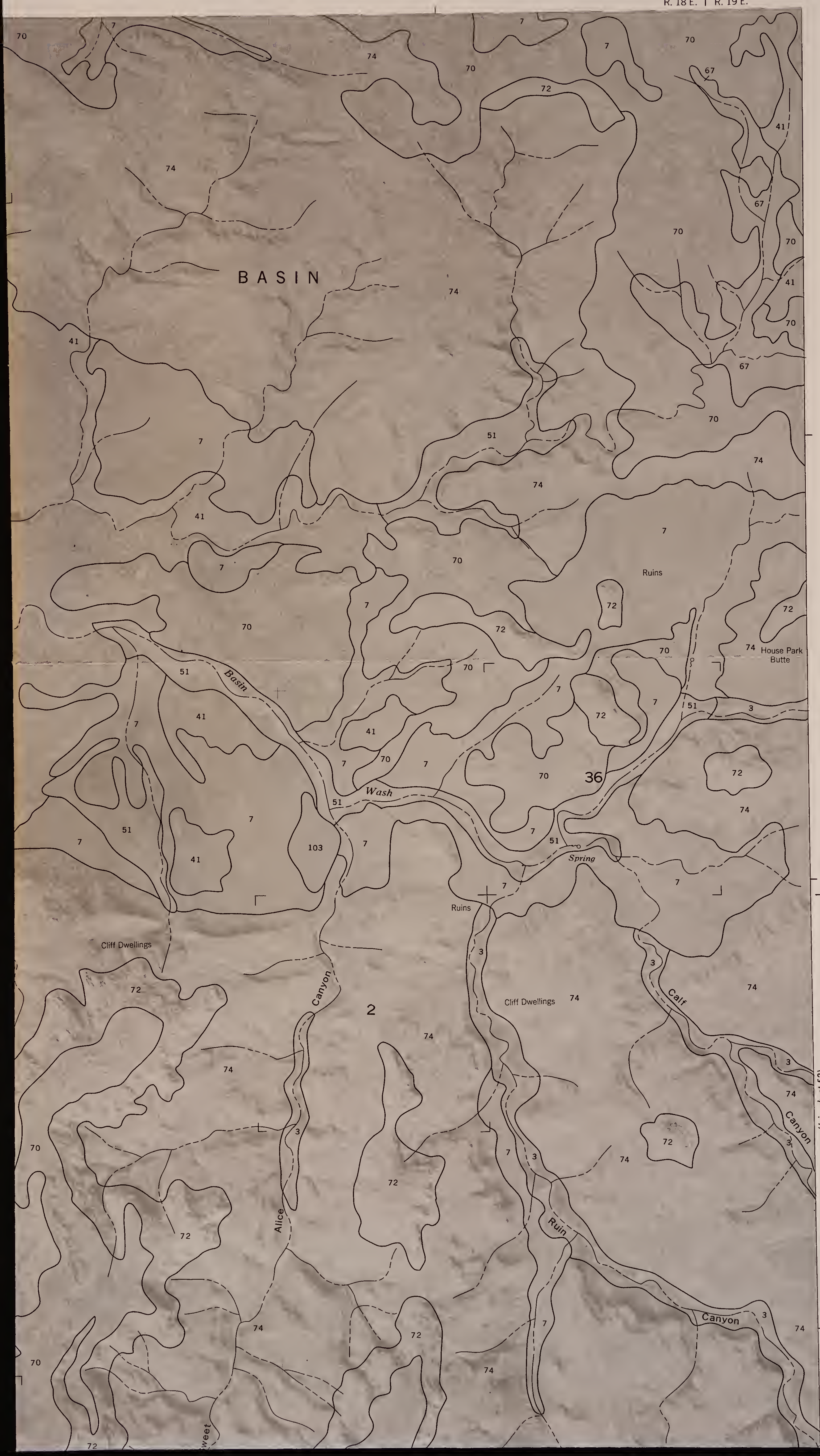
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

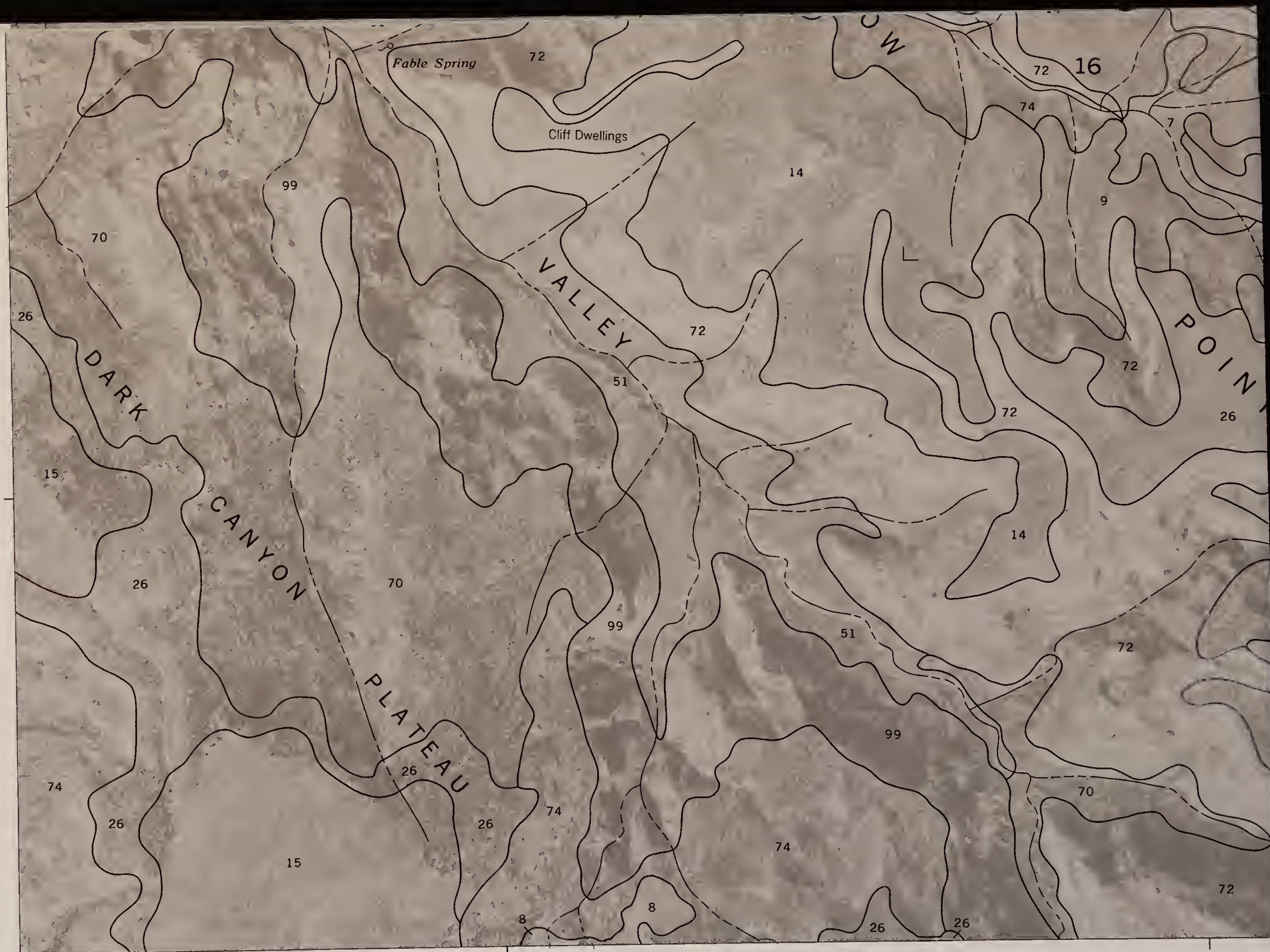


#24363160 ID:88071562

S
599
.U9
C36
1991

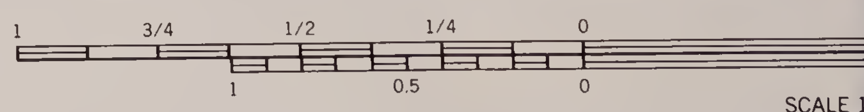
SHEET NO. 51
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



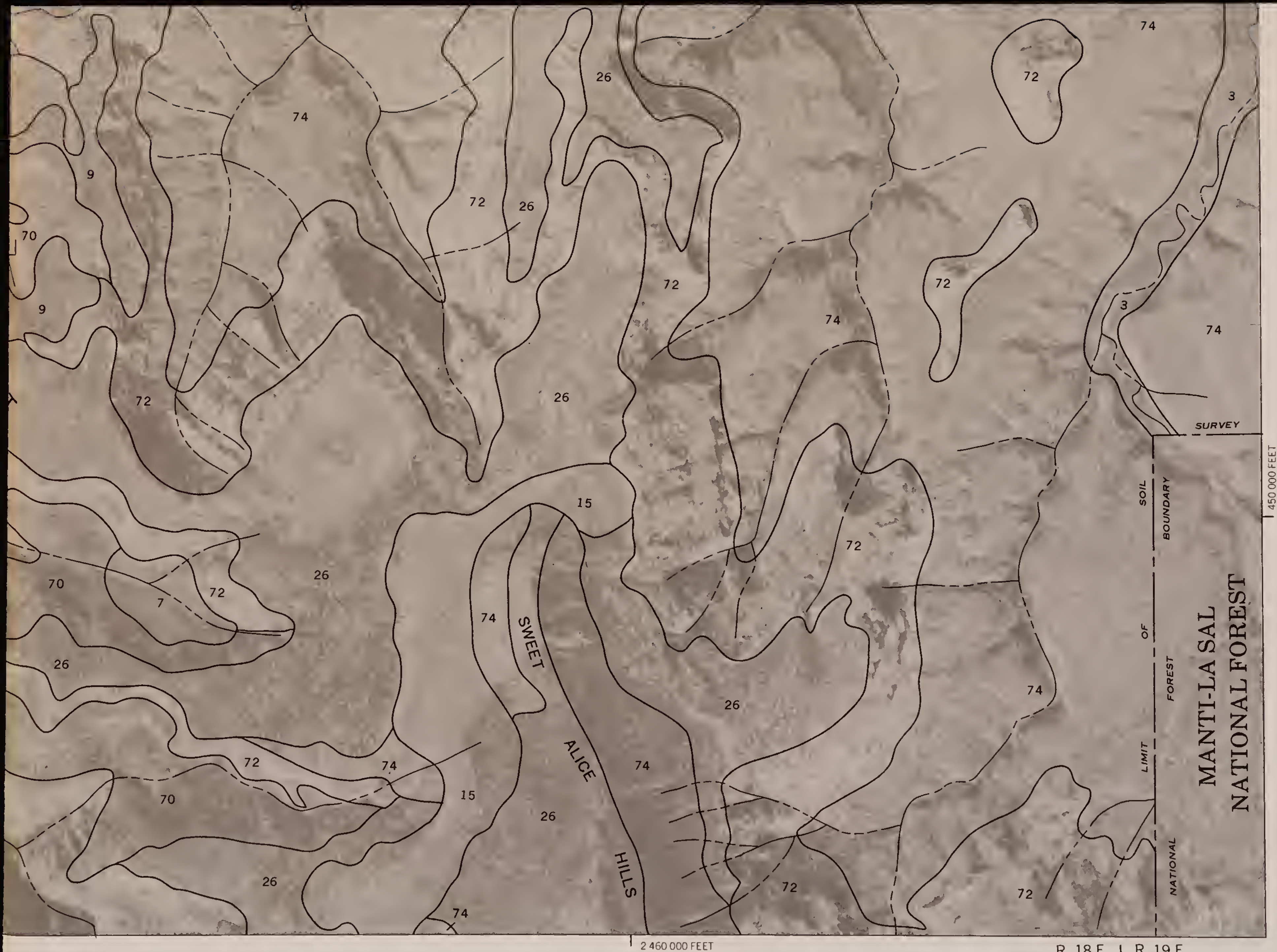


R. 17 E. | R. 18 E.

(Joins inset A, sheet 53)



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 2 MILES

1 2 KILOMETERS

:4 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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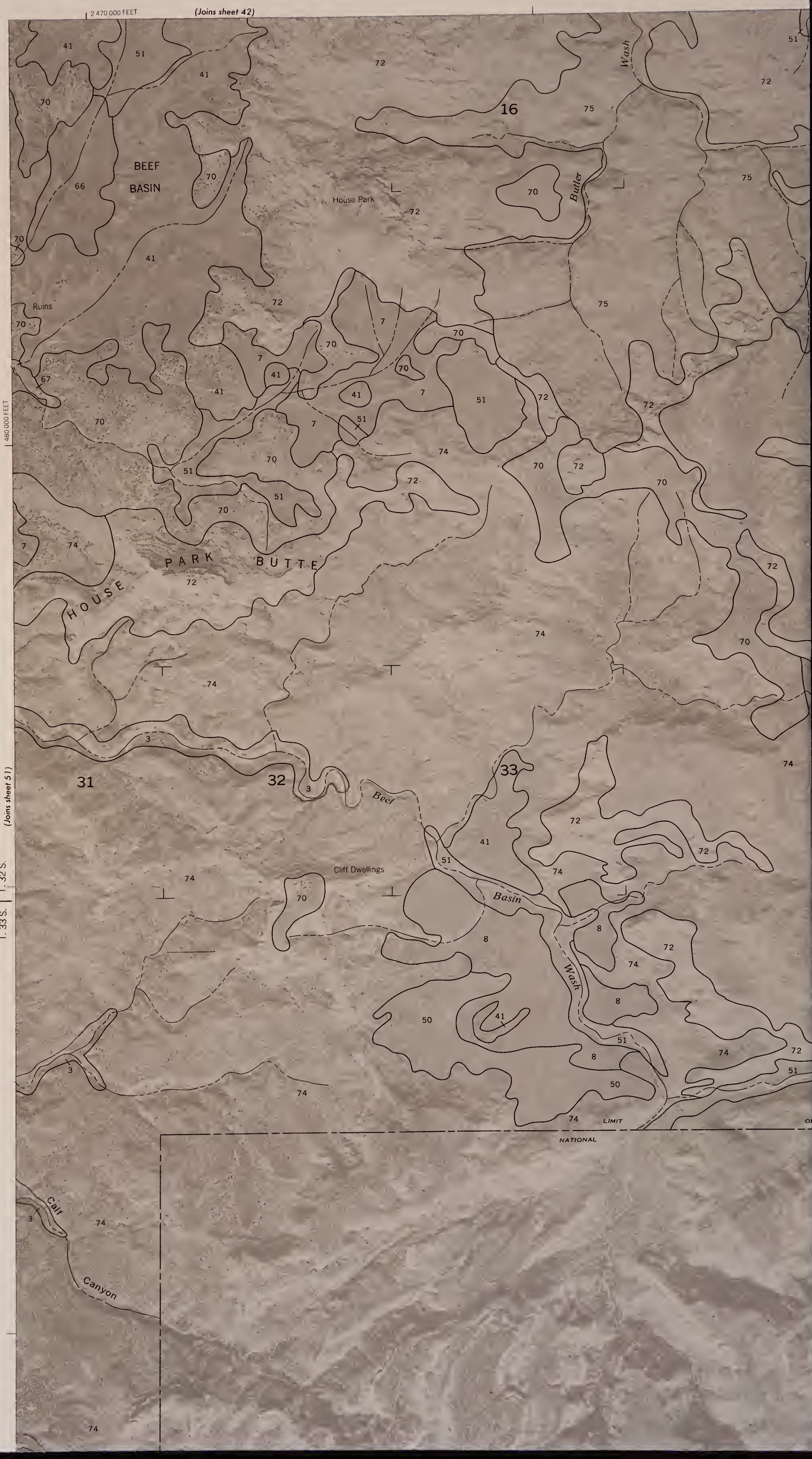
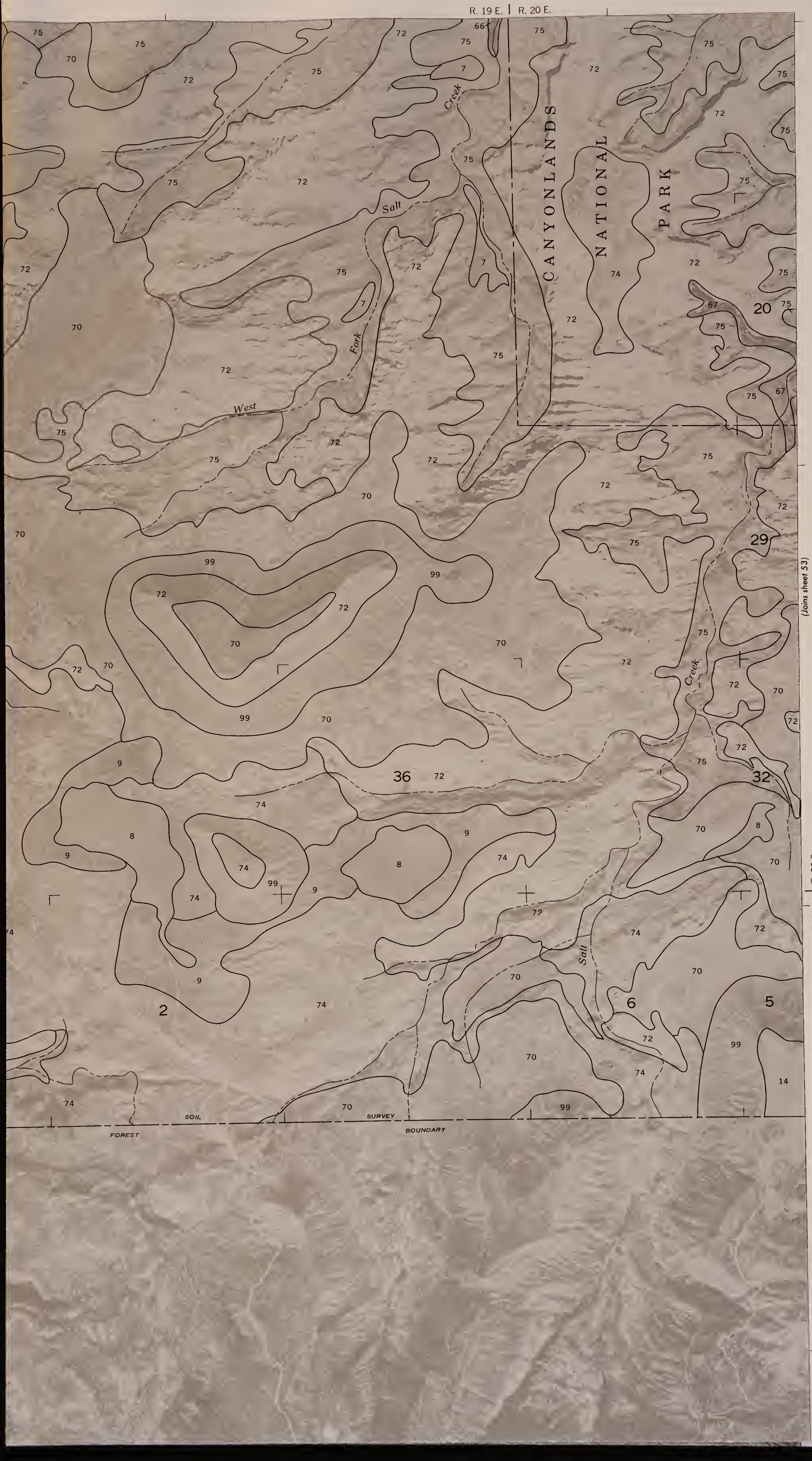
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SHEET NO. 52

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



1 3/4 1/2 1/4 0
1 0.5 0

SCALE 1

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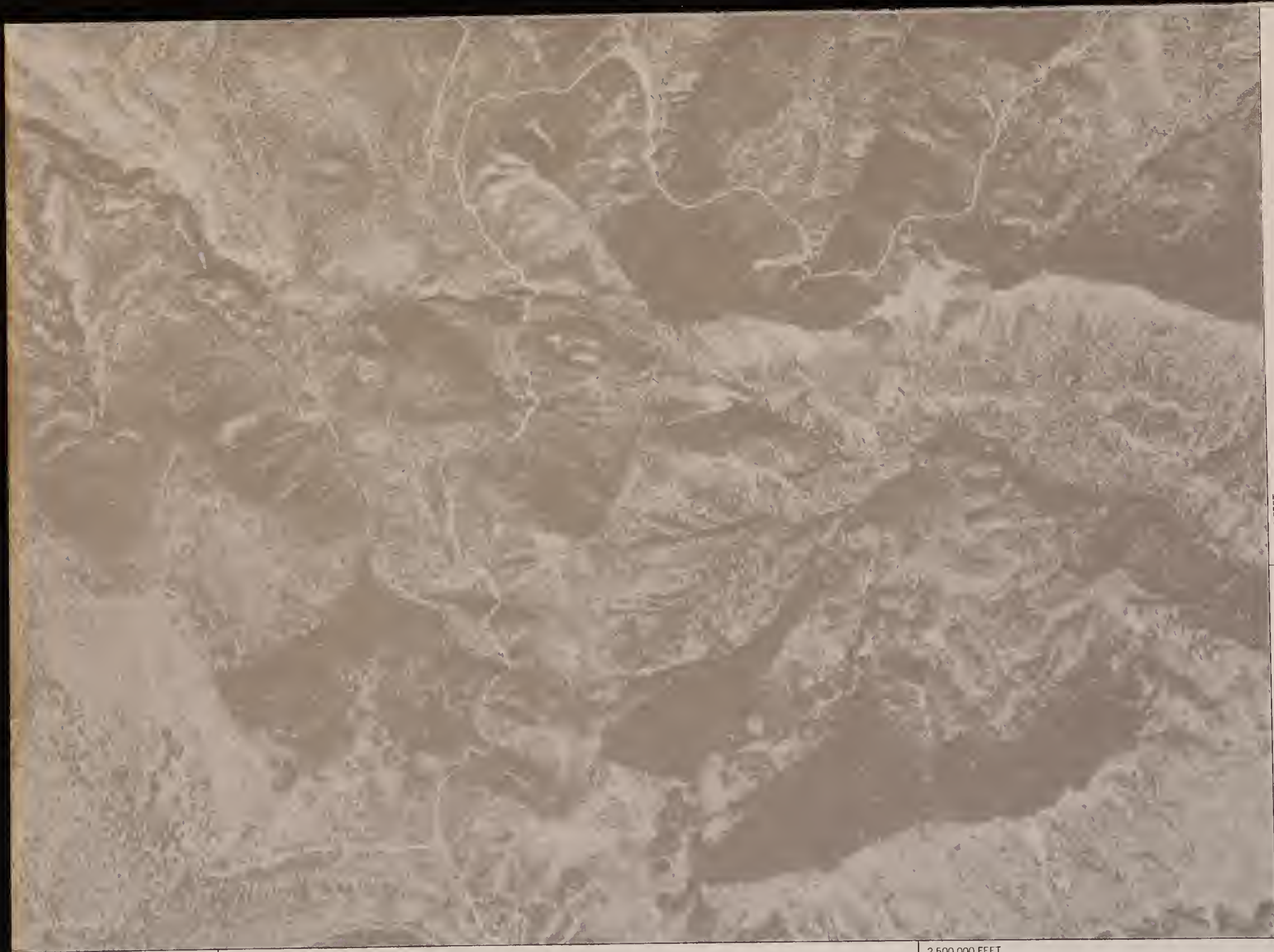
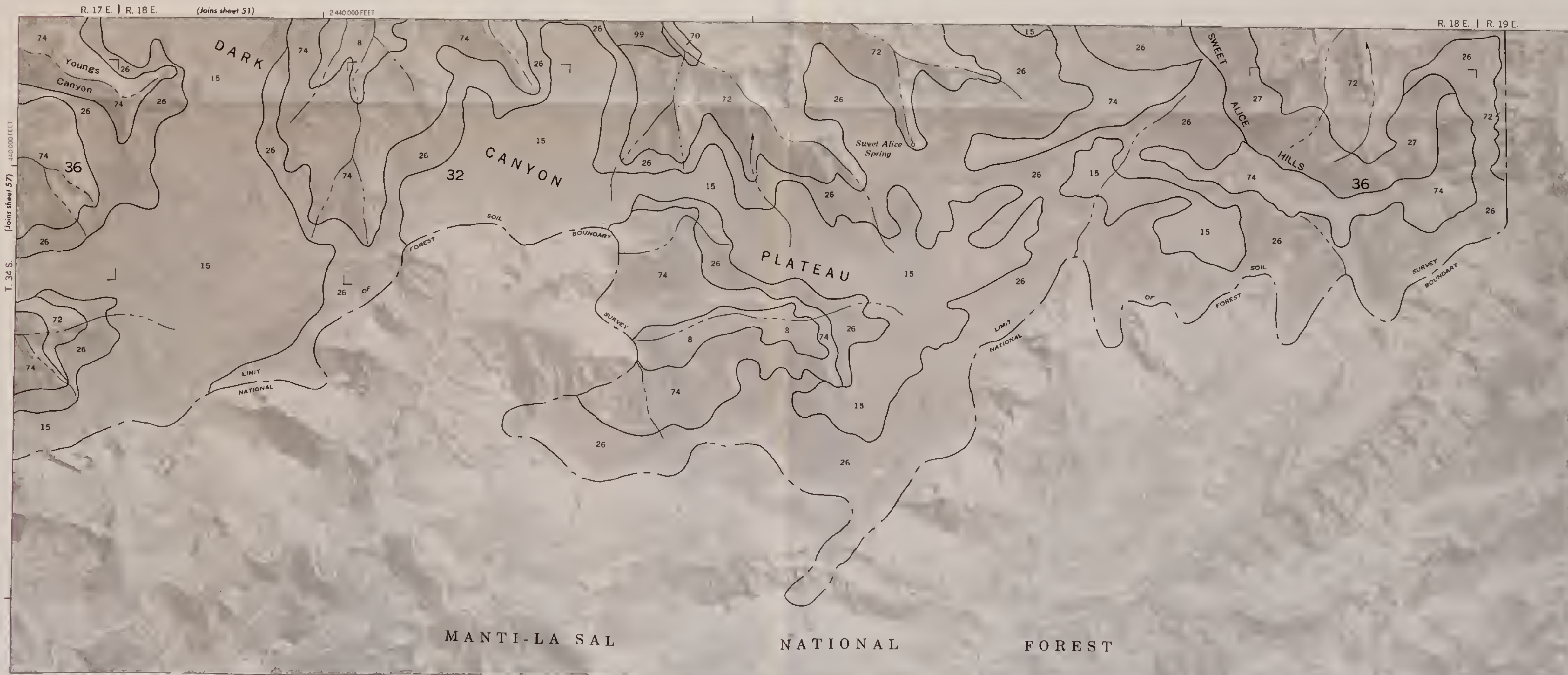
CANYONLANDS AREA, UTAH, PARTS OF



1 2 MILES

1 2 KILOMETERS

24 000



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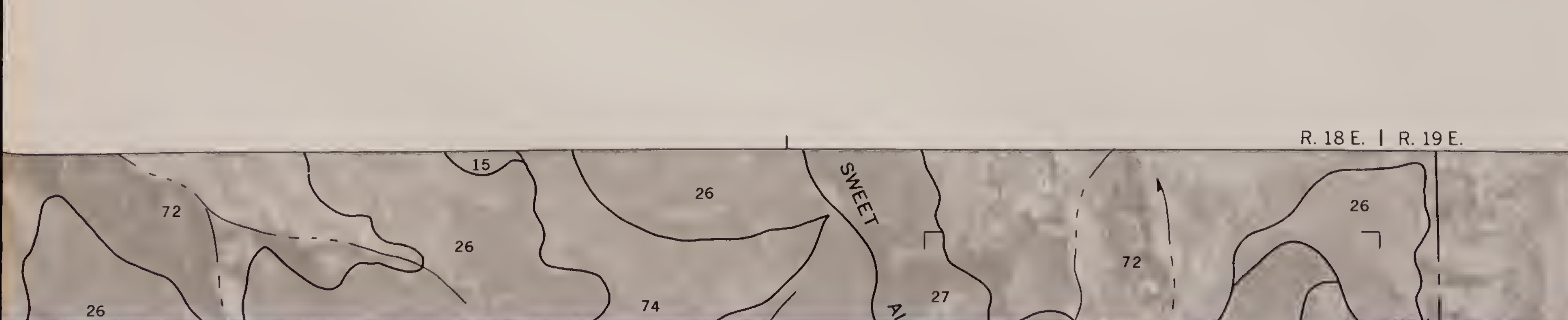
SCALE 1:24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

#24363150 ID. 88071562

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



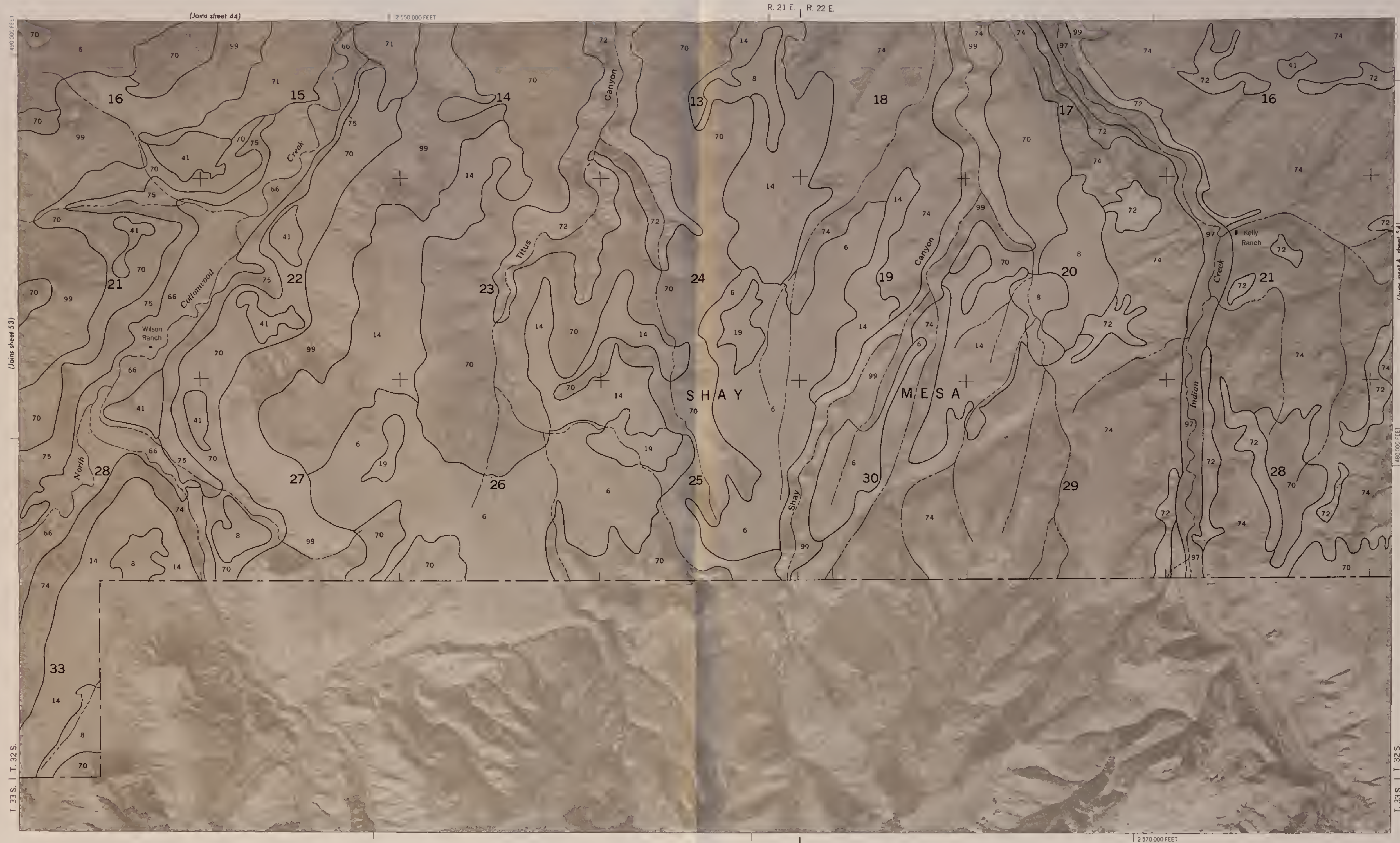
1 3/4 1/2 1/4 0

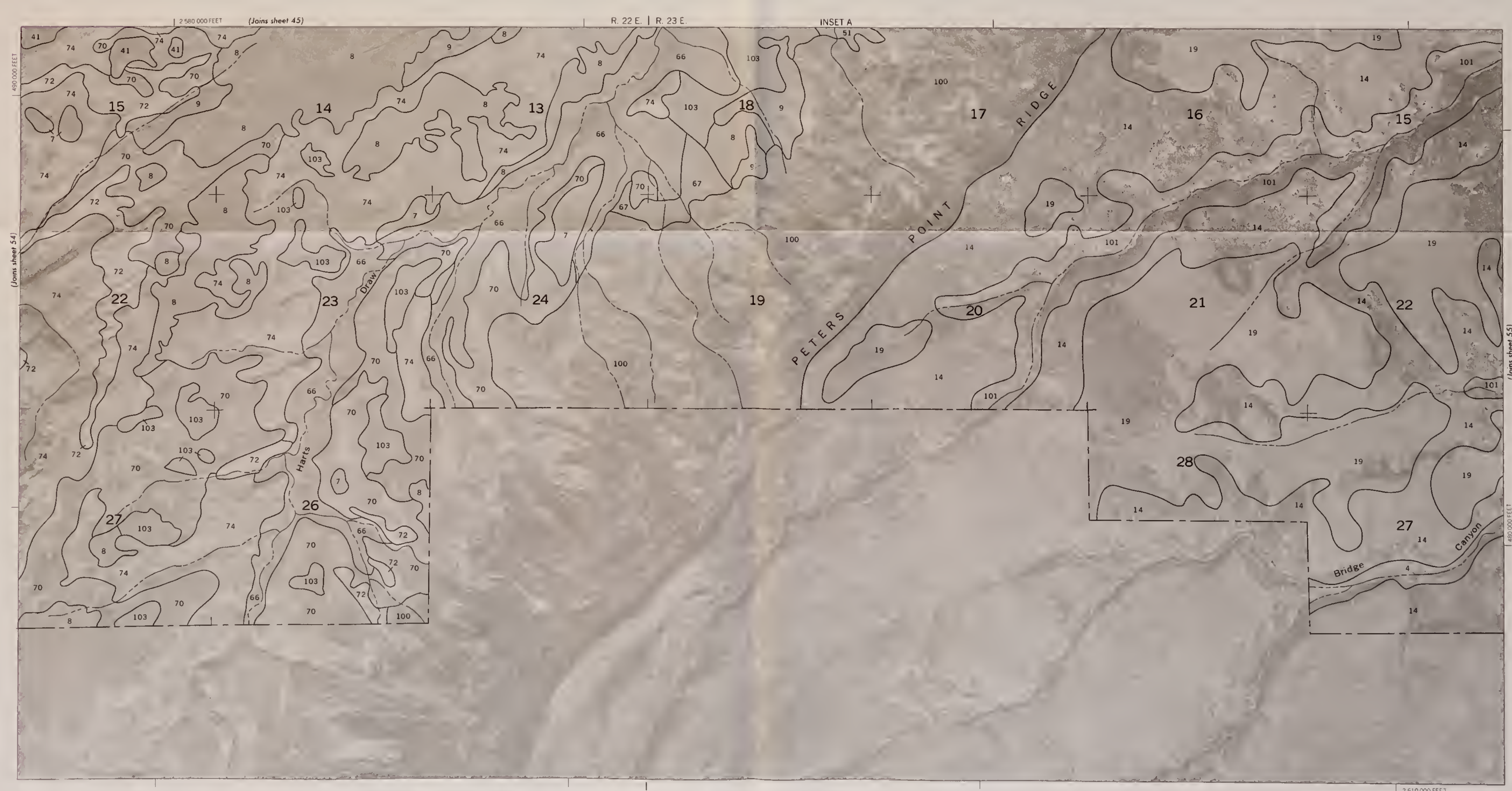
1 0.5 0

SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


Sweet Alice
Spring
26
15
74
36
27
CE
HILLS
ATEAU
SOIL
OF
FOREST
SURVEY
BOUNDARY
LIMIT
NATIONAL
T. 34 S.
430 000 FEET
NATIONAL
FOREST
2 460 000 FEET
R. 18 E. | R. 19 E.
1
2 MILES
1
2 KILOMETERS
4 000





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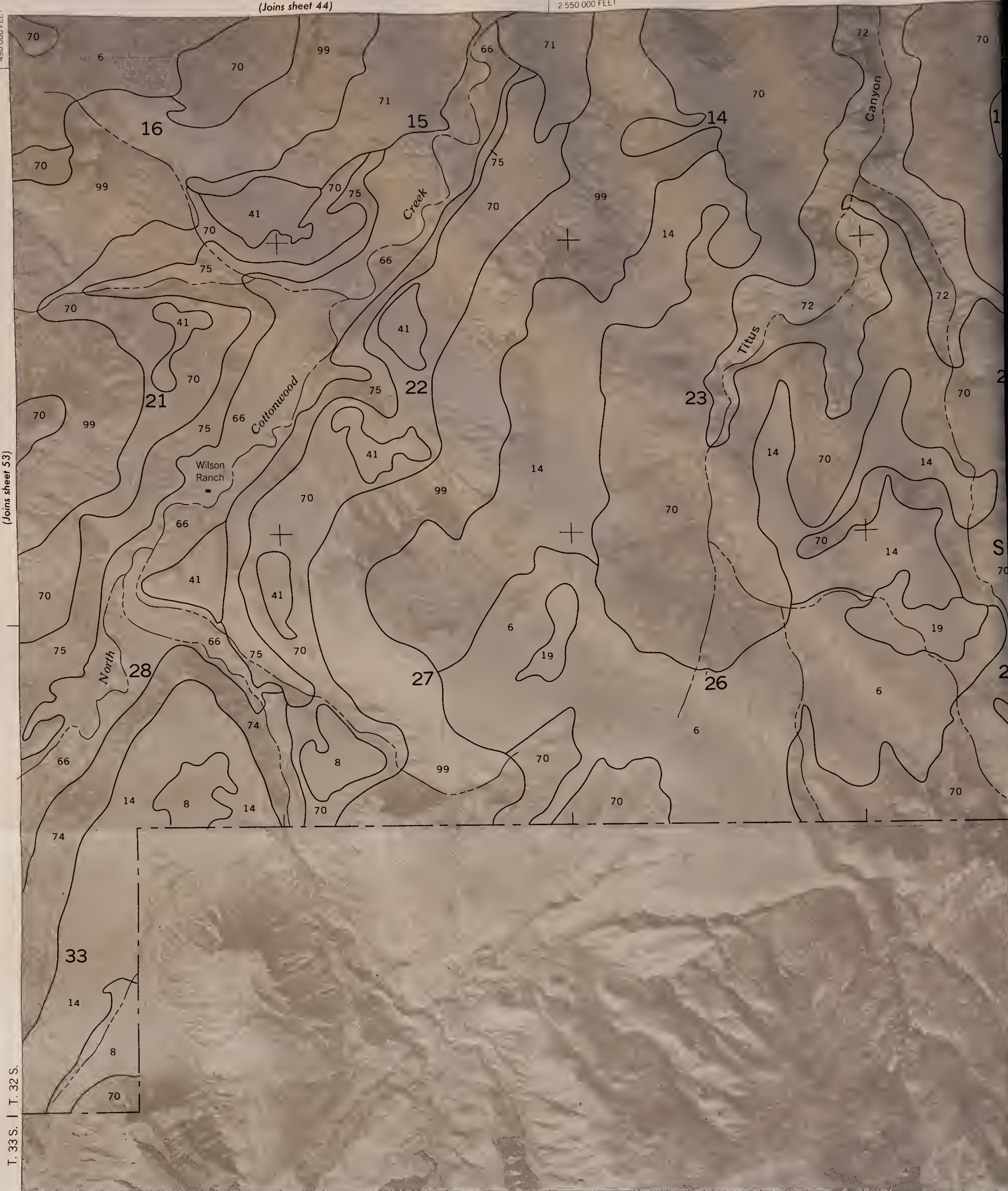
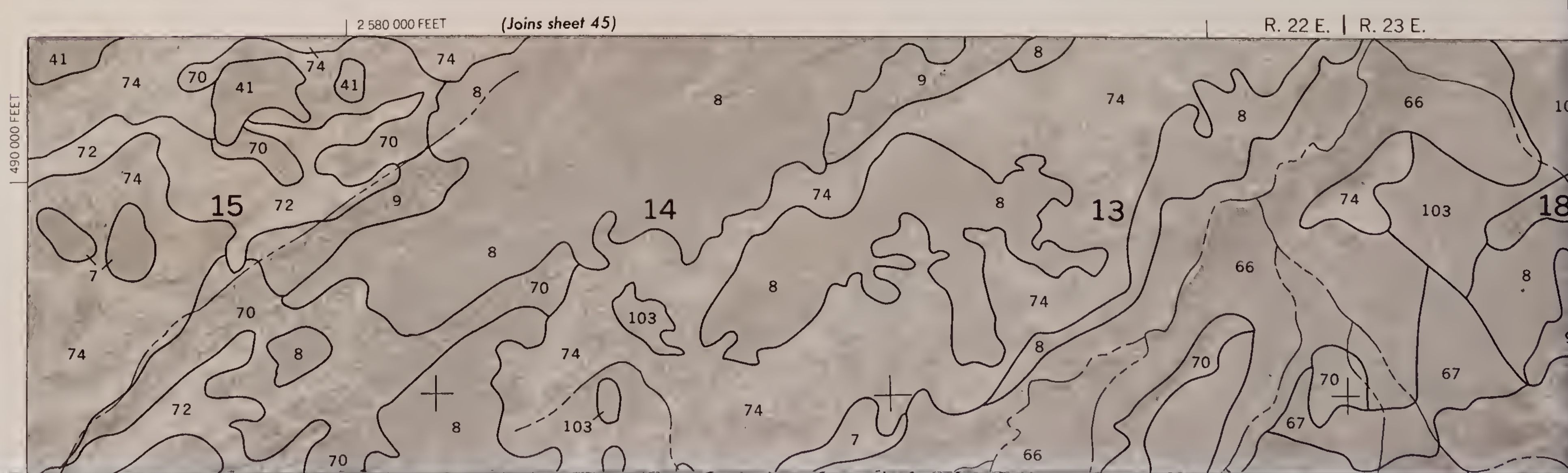
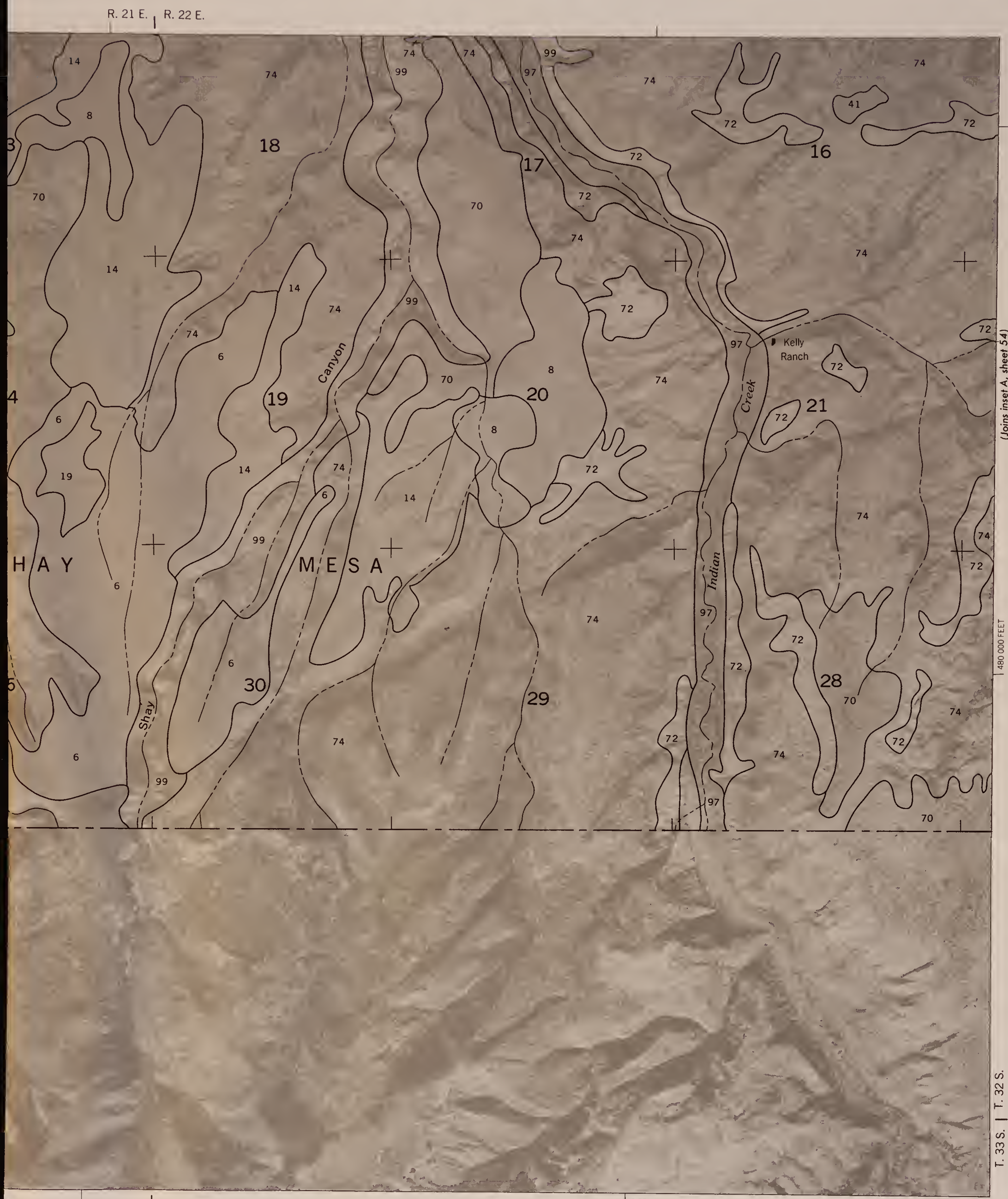
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

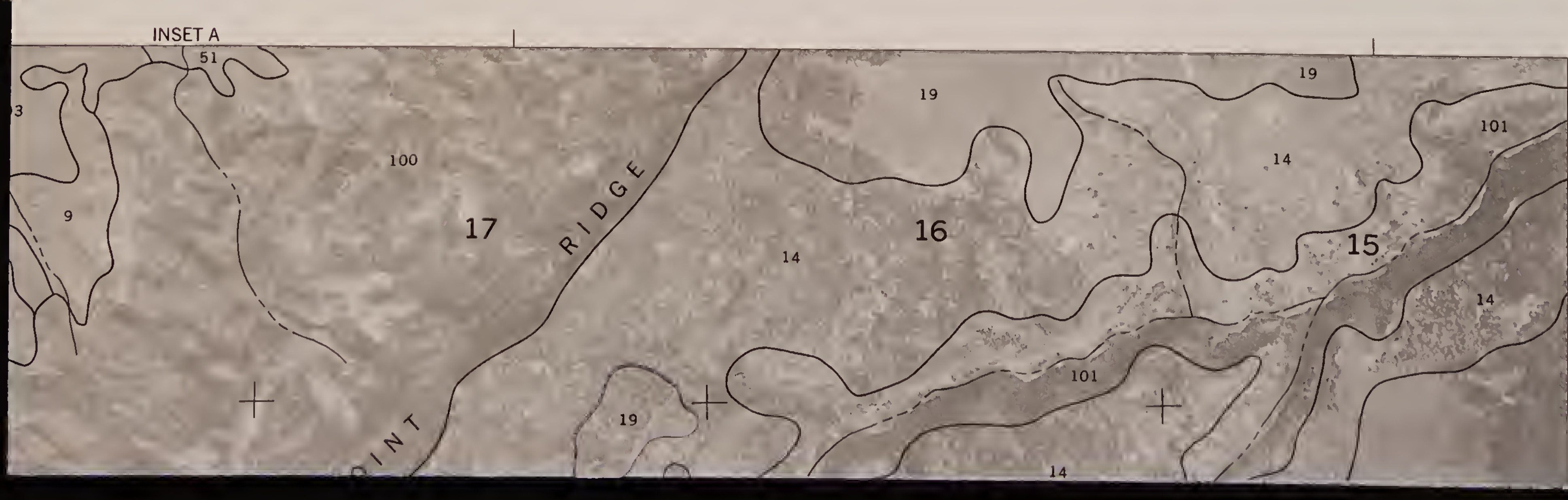
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

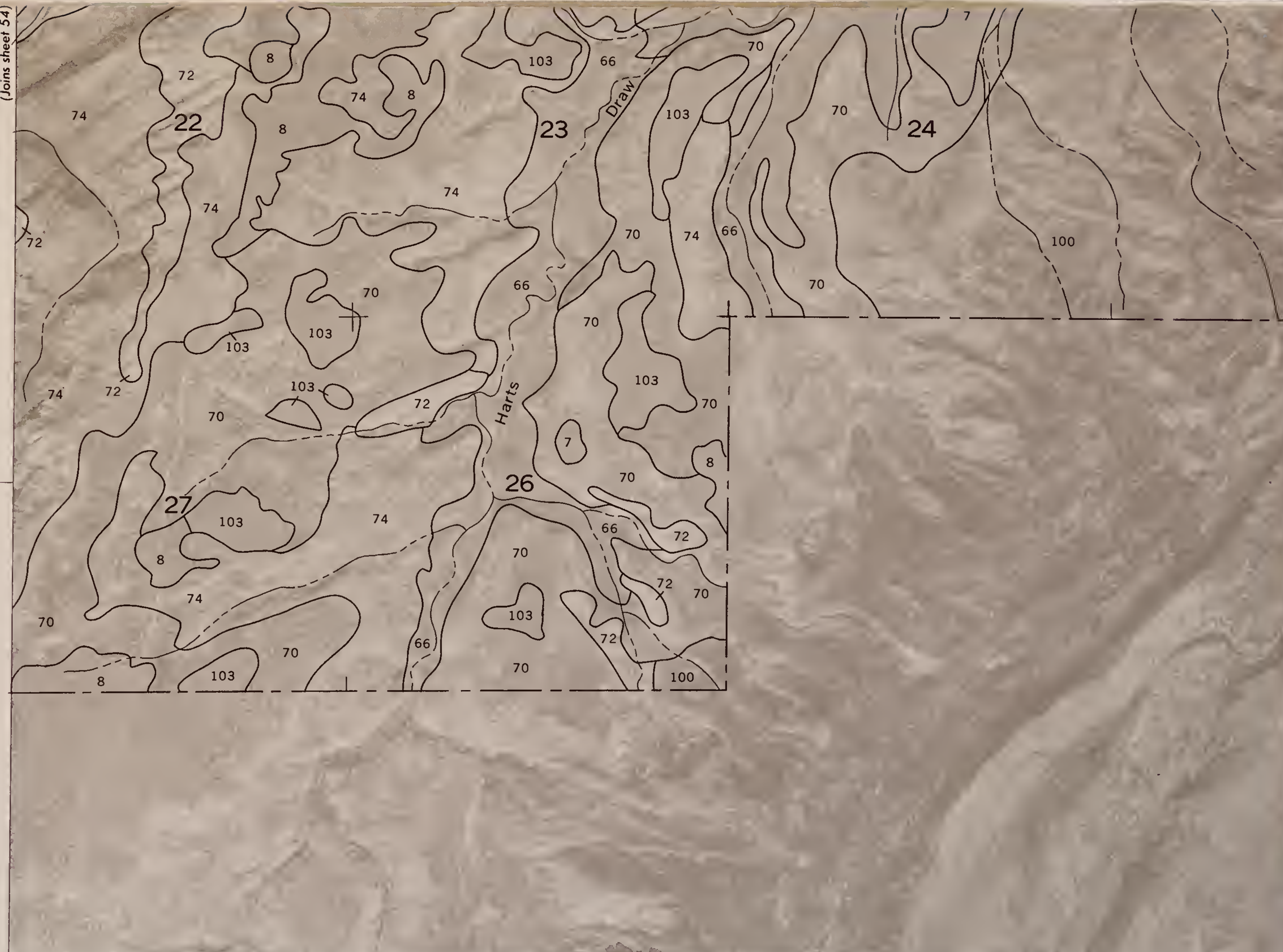




SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES







1 3/4 1/2 1/4 0

1 0.5 0

SCALE 1:

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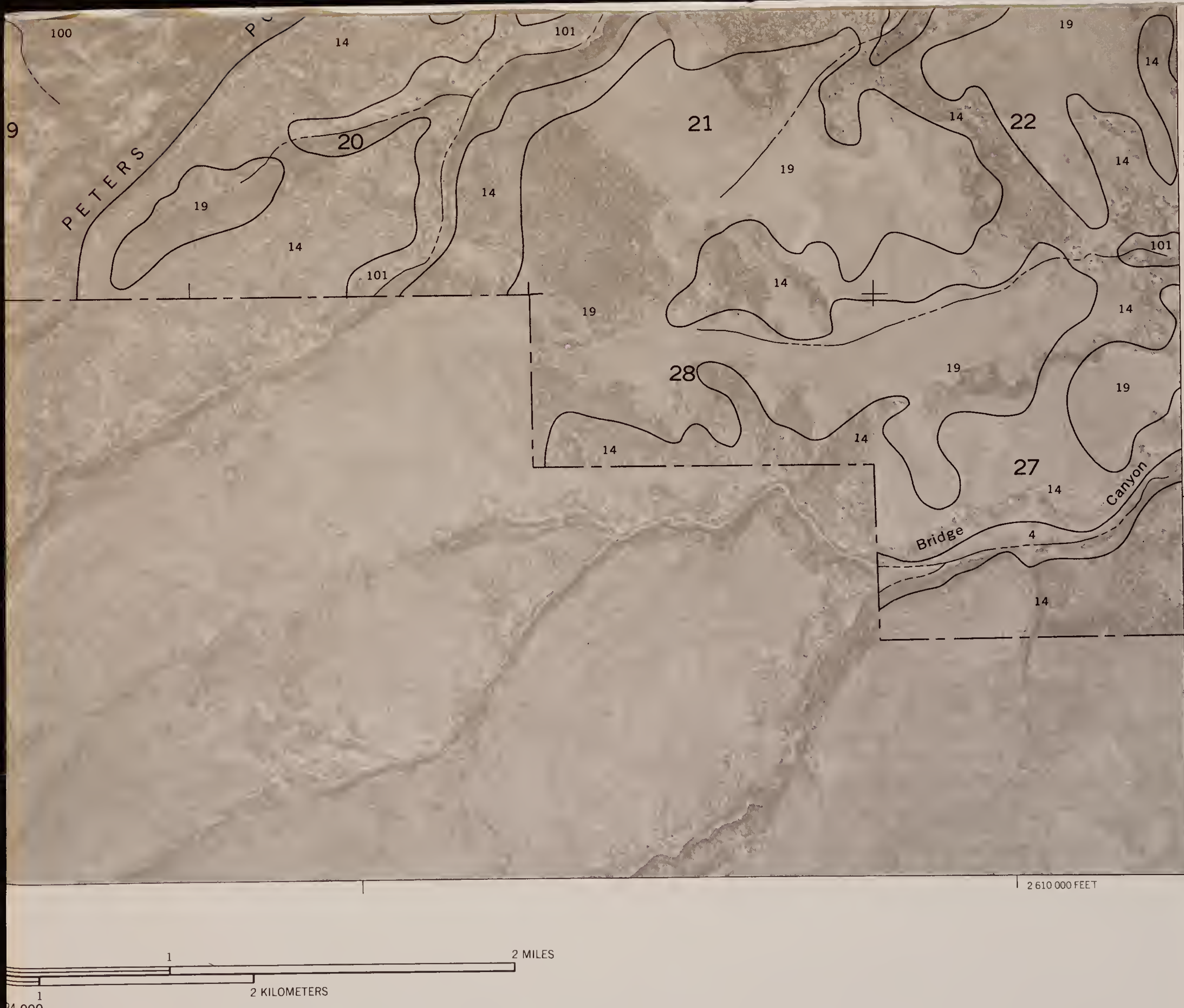


GRAND AND SAN JUAN COUNTIES NO. 54

SHEET NO.54 OF 57

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

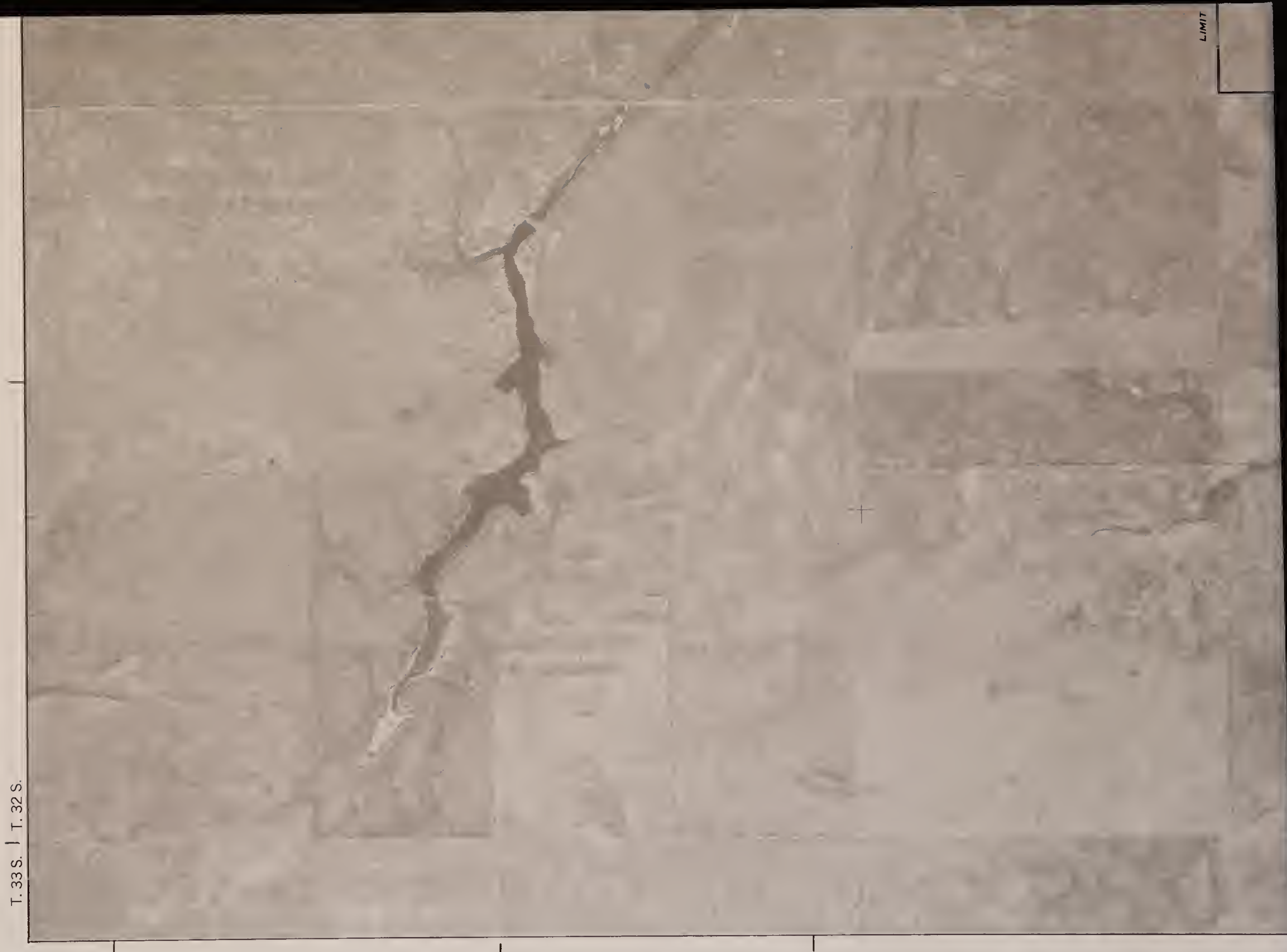
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

#24363150 ID:88071562

SHEET NO. 55

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES

2 640 000 FEET

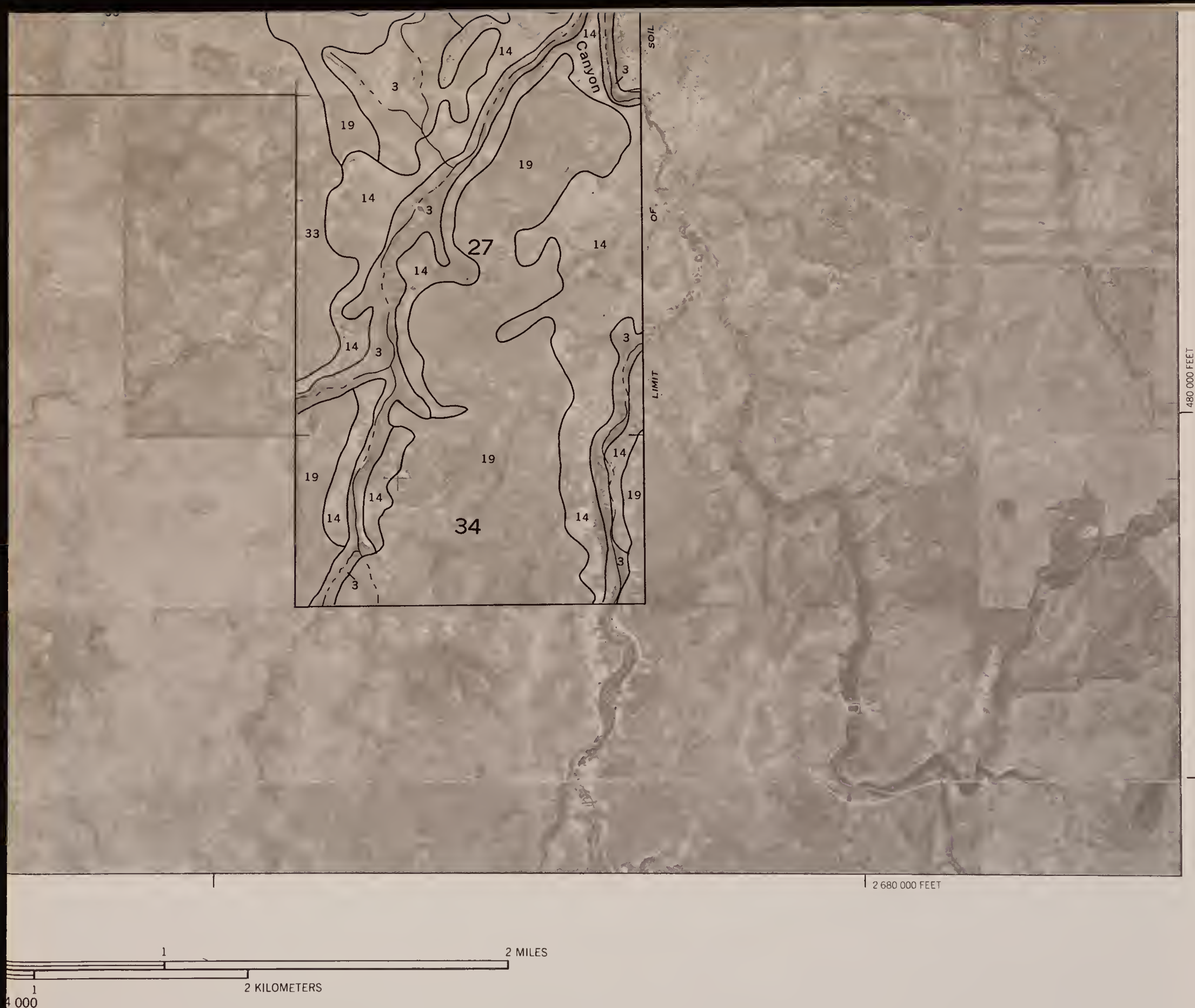


1 3/4 1/2 1/4 0

1 0.5 0

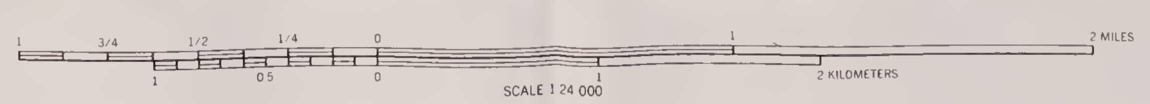
SCALE 1:2

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 and 1976 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



RAND AND SAN JUAN COUNTIES NO. 55

SHEET NO.55 OF 57



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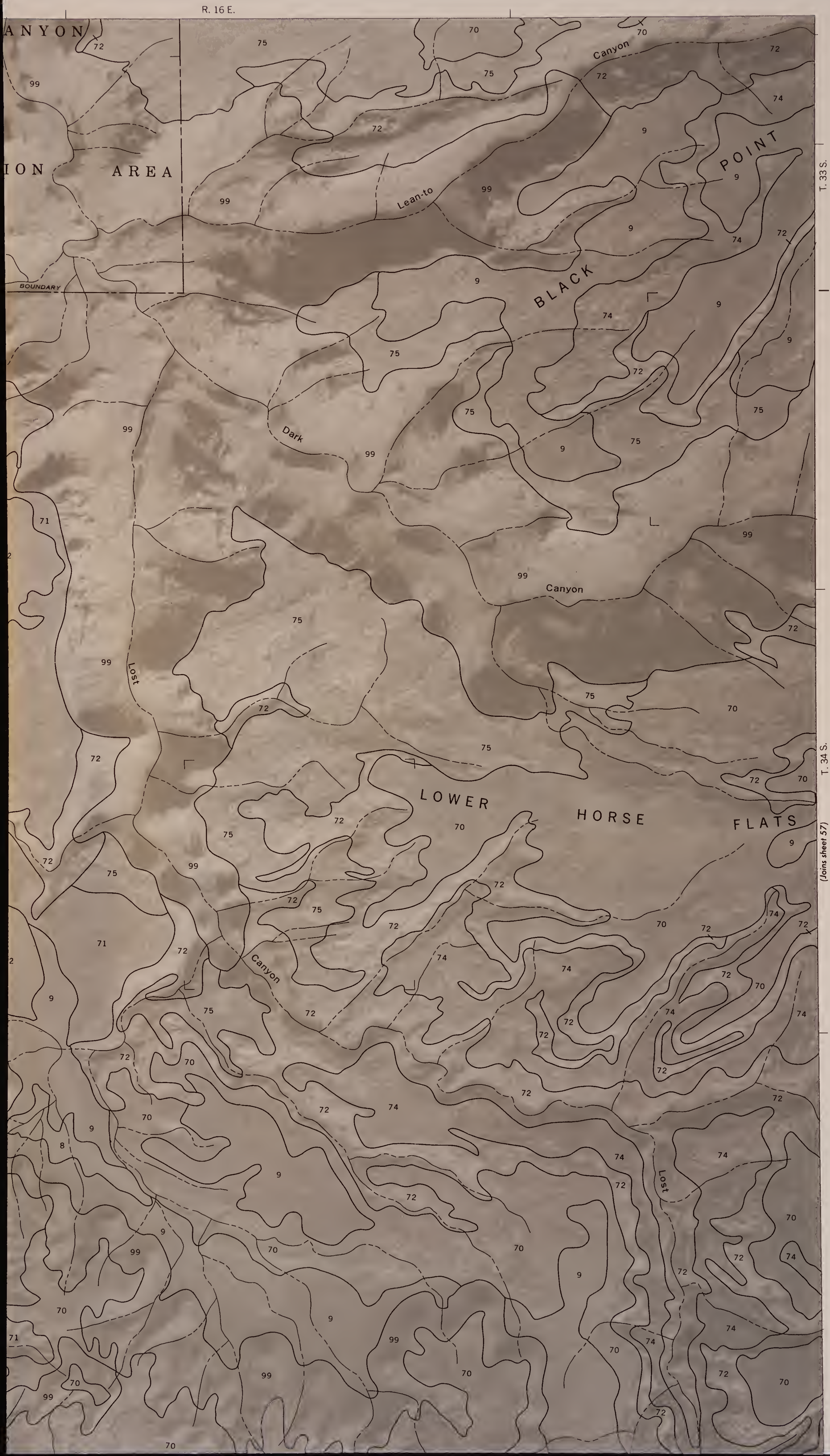
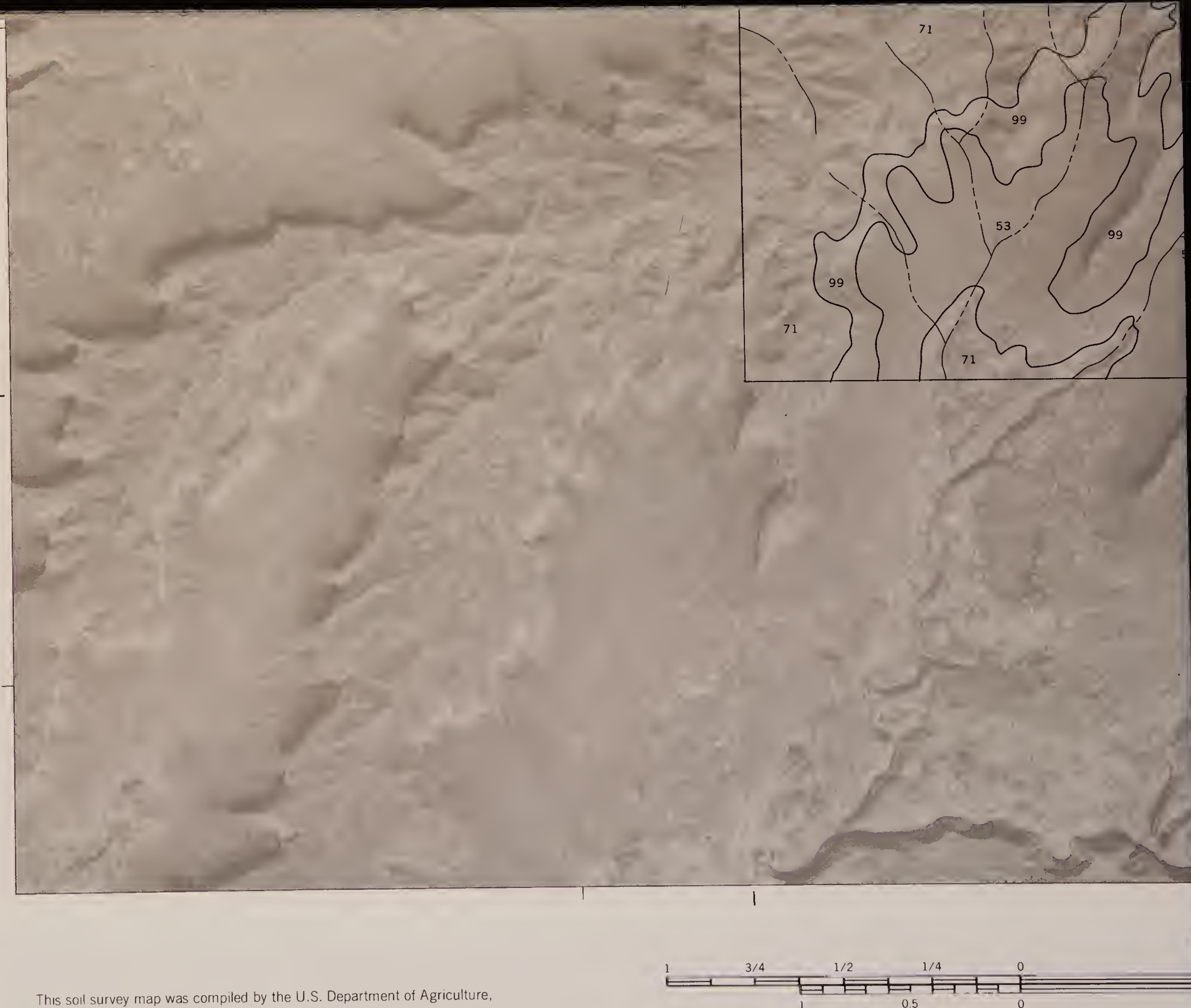
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 56

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





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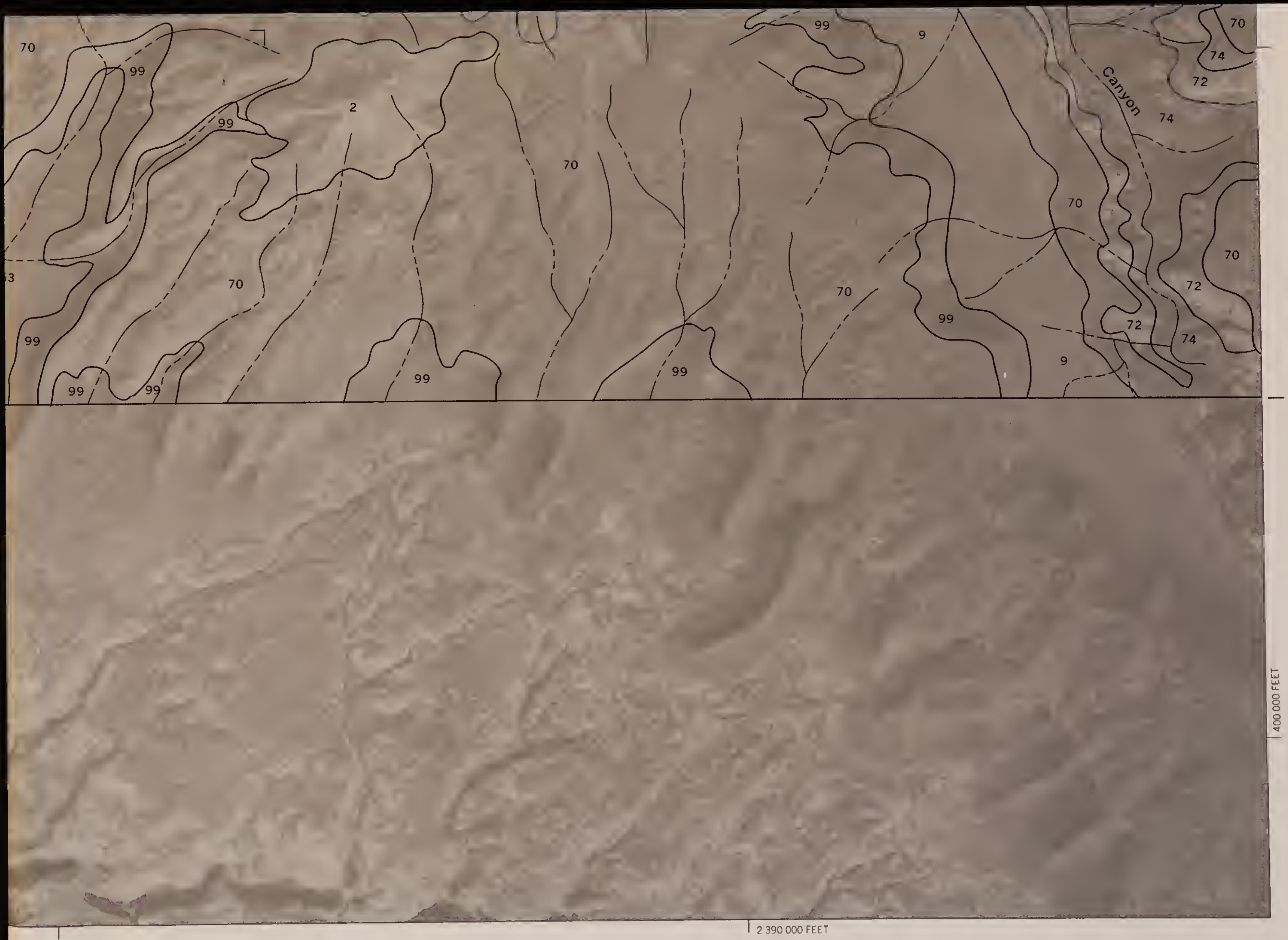
CANYONLANDS AREA, UTAH, PARTS OF



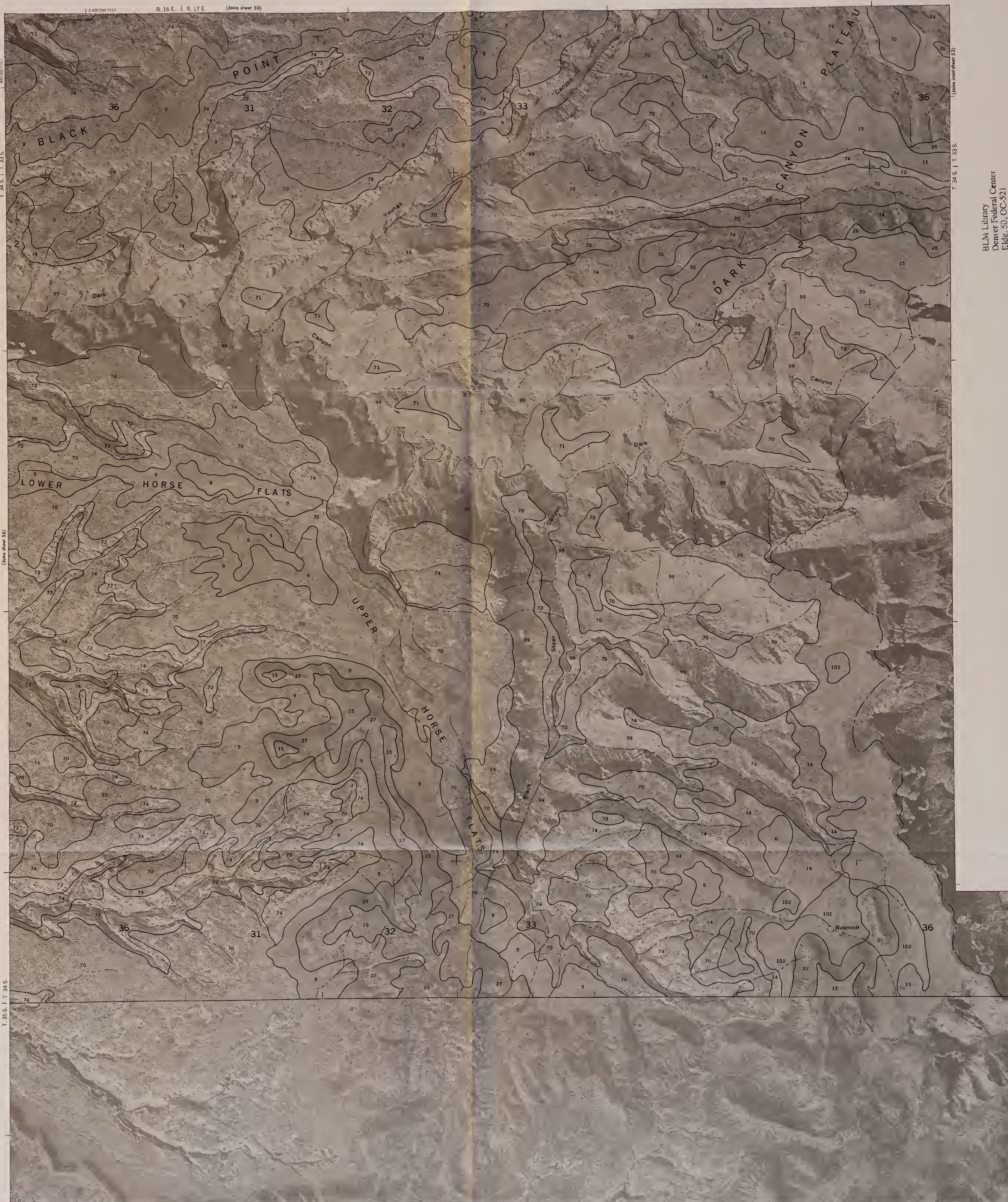
1 2 MILES

1 2 KILOMETERS

24 000

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 57
SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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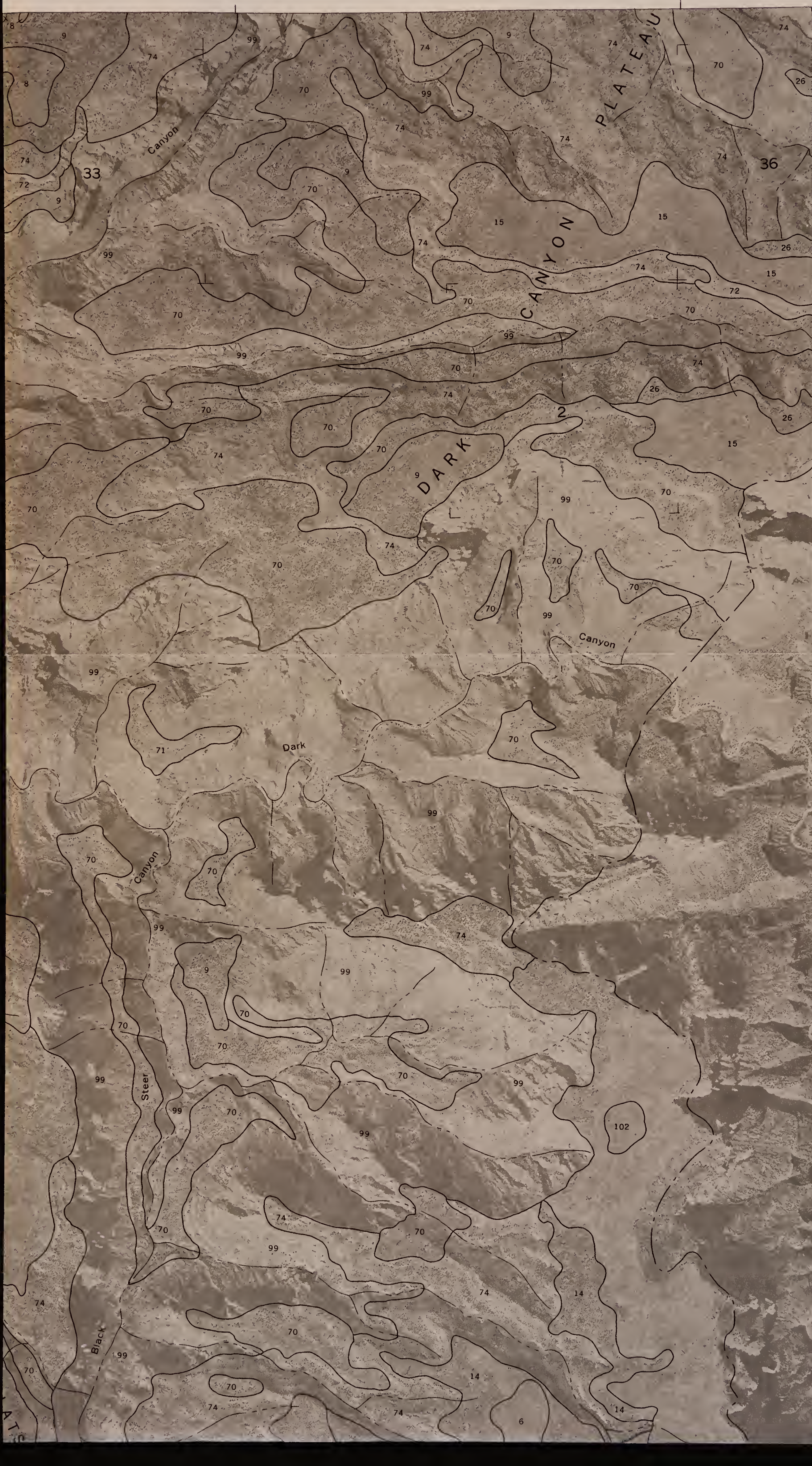
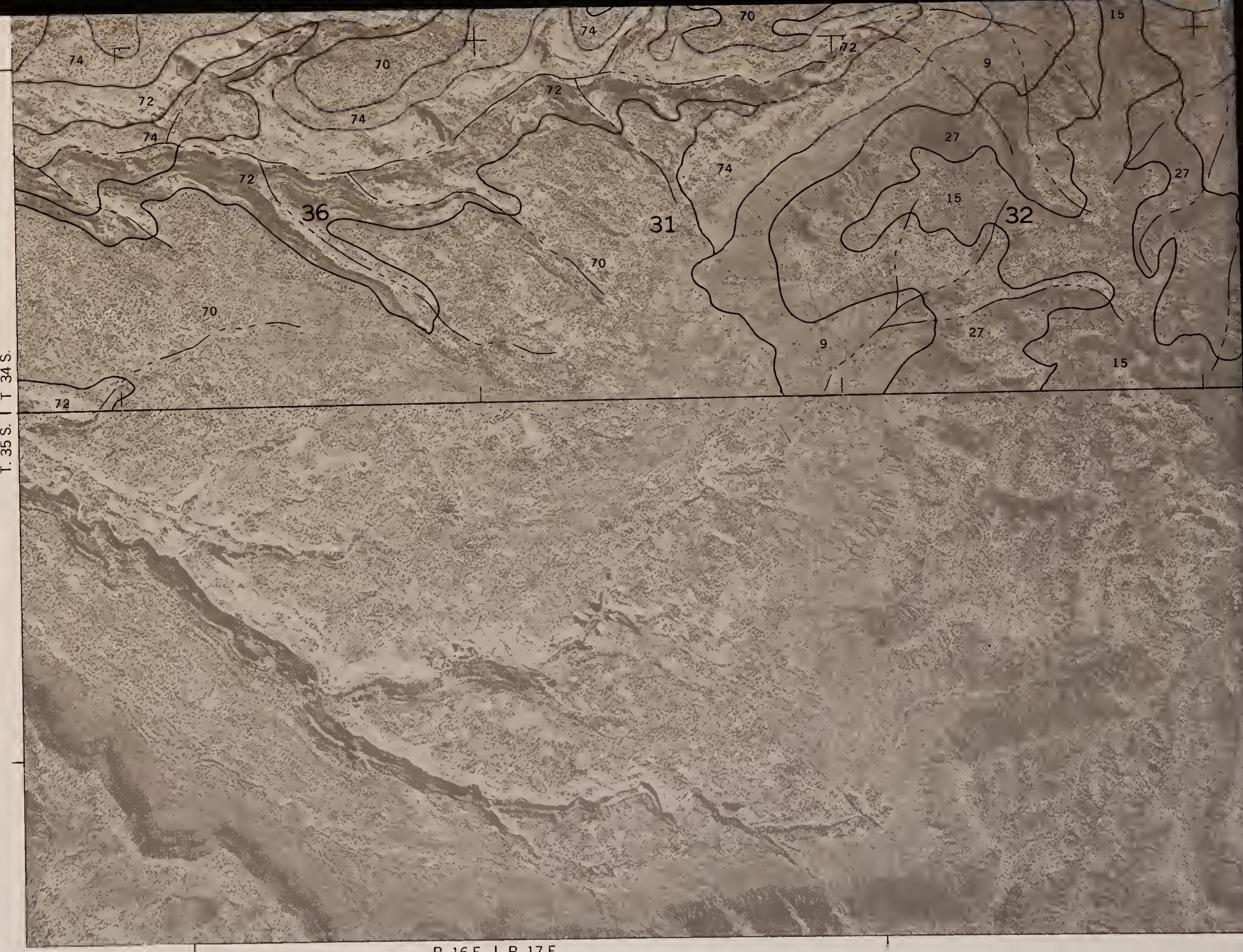
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NO. 57

SOIL SURVEY OF CANYONLANDS AREA, UTAH, PARTS OF GRAND AND SAN JUAN COUNTIES





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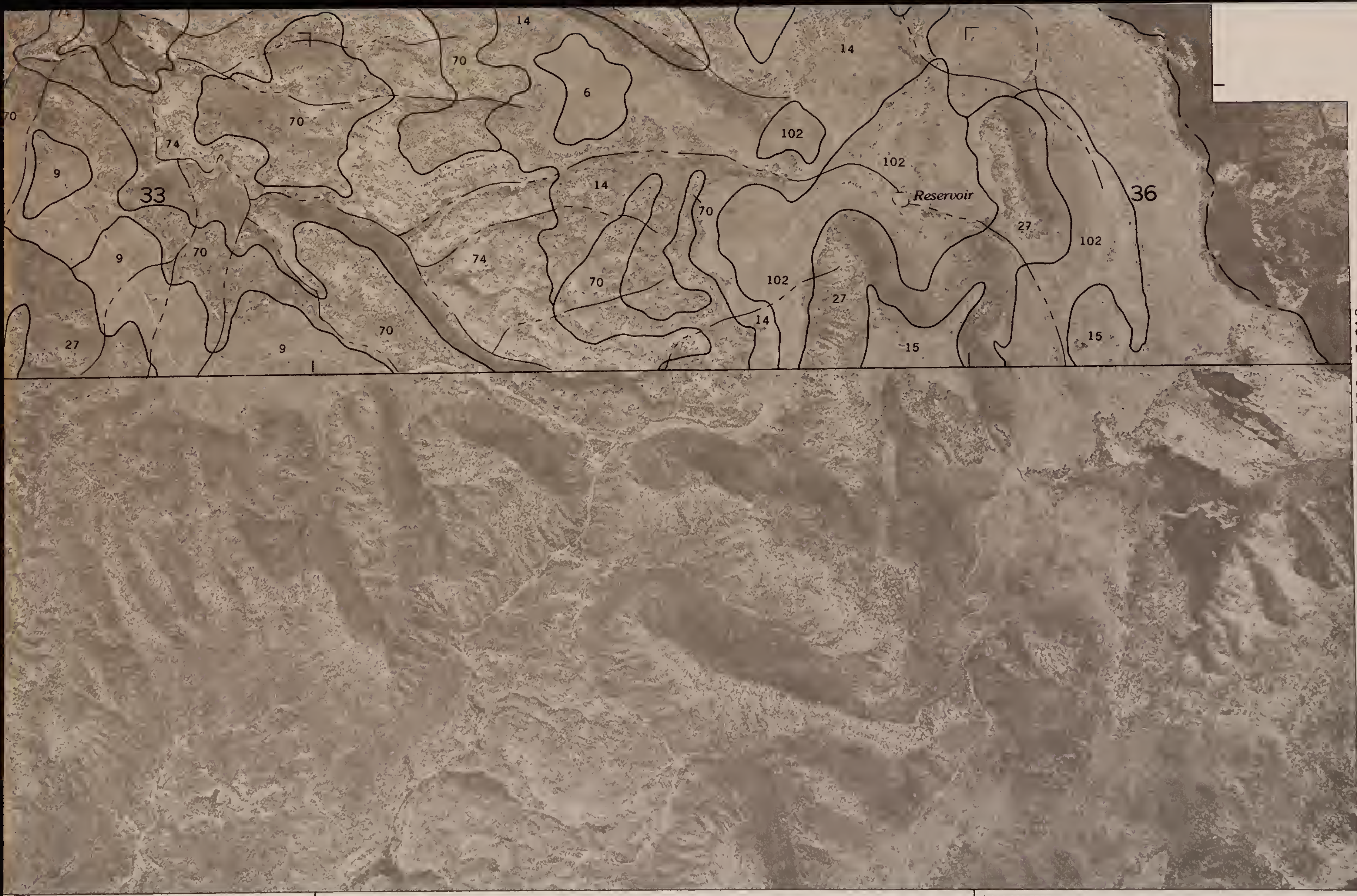

1 2 MILES

1 2 KILOMETERS

1:24 000